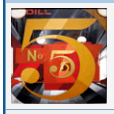
[VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

04-01-2018, 10:08 PM — **Post: #1**



Valentin Albillo
Senior Member

Posts: 636
Joined: Feb 2015
Warning Level: 0%

[VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Hi all,

After a mere 10-year hiatus here's again my super-duper **S&SMC April 1st, 2018 Spring Special** to welcome the new season and give you all a chance to put to good use both your favourite HP calculator and your programming ingenuity.

The thing is, I've always been very interested in primes and algorithms for factorization and primality tests of big numbers and recently computed the factorization of

555555555555544444444444444333333333333333222222222222222211111111111111

and proceeded to check it out with my trusty **HP-71B** (it checked OK!), so I got the idea of making some kind of primality testing the main subject of this *S&SMC#22*, plus assorted goodies. Read on !:

Notes :

Any HP model of your choice may be used but I'll suggest a *Minimum Recommended Model* (MRM) for each problem, which is the minimum model I deem capable of solving it more or less comfortably. Obviously, using a more powerful model might make life easier and, conversely, using a less powerful model might succeed or not.

If you use an HP41C/CX/CV you can also use any of these ROM: Math, Advantage, Card Reader, Printer. No other ROM or extra routines allowed. If you use an HP-71B, you can also use any of these ROM: Math, HPIL, JPC, STRNGLEX Lex file. No other ROMs or LEX files allowed.

Using a PC or any computing device other than a physical or emulated HP calculator is strictly disallowed. You can write your code in any language supported in any HP calc and it must run in that calc (i.e.: RPN, RPL, 71B BASIC, 71B FORTH, etc). Googling for the solutions is lame beyond belief, frankly.

The Challenge - Main Course:

[MRM: HP42S and up] Write code that takes as input any of the following six test numbers and simply outputs whether it's a prime or not (no need to compute or output its factorization if not prime). Your code might or might not work for some other arbitrary numbers of arbitrary length but it should definitely output the correct result for each of the following six test numbers:

8082737769637879
8969837365776578736769808273776 9
6779778079837384697885776669 82
7365778082737769847979
6779778079837384696583876976 76
7378686969688082737769

Your code must be as short and fast as possible, in that order. Within a few days I'll give a 72-byte solution for the **HP-71B** (an User-Defined Function) and a 39-byte solution for the **HP42S** (a program) but meanwhile let's see what you can do.

The Challenge - 4 Desserts:

1) *[MRM: HP-10C and up]* Starting from no assumptions (angular mode, stack contents, memory contents, etc) write a program to output the constant 9.99999999999 (for 12-digit machines, 12 nines) or 9.999999999 (for 10-digit machines, 10 nines). Your code must be as short as possible. For instance, in the HP-71B you could use:

1 DISP 9.99999999999

but this is 14 bytes long and as *"1 DISP"* itself takes 5 bytes you're using 9 additional bytes to generate the constant, which are way too many. I'll give an 8-5 = 3-byte solution for the plain vanilla **HP-71B**, see what you can do with your favourite HP calc.

2) *[HP-71B specific; perhaps RPL models too, not sure]* Everyone has seen math expressions which give the machine value of **Pi** as a result so let's try for a slightly different thing here.

Starting from no assumptions (angular mode, stack contents, memory contents, etc) find the shortest, simplest command-line math expression which upon evaluation in your calc produces the machine value of **-Pi** (i.e.: -3.14159265359 for 12-digit calcs, -3.141592654 for 10-digit ones).

Your expression can't use PI (of course!), strings/string functions, trigonometric/logarithmic/exponential/gamma/complex functions, and also last but not least, neither any digits (in any base) nor "-" should appear in it. I'll give a 6-byte, 16-character solution for the **HP-71B**, let's see yours.

Also, if you succeed, try to get **-Pi/100** or even **-Pi/10000** under the same conditions. I'll also give a 6-byte solution for those as well.

3) *[MRM: HP-11C and up]* Informally, for real-valued functions of real-valued arguments we may say that G(X) is the *inverse* function of F(X) if theoretically G(F(X)) = X. For instance, with F(X)=EXP(X) we have that G(X)=LN(X) and G(F(X)) = LN(EXP(X)) = X.

This said, produce some real-valued **F(X)** of a real-valued argument X and its theoretical inverse **G(X)** for your favourite HP calc such that the actual evaluation of G(F(X)) differs from X by at least 2% of X for some relatively small argument X, say X less than 20 in absolue value. No code required, just the F(X) and G(X).

If you succeed in finding such an F(X), try to find the smallest value of X which results in said 2% difference.

I'll give my solution for the **HP-11C**, **HP42S** and **HP71B** (the exact details differ slightly from calc to calc).

4) *[HP-71B specific; perhaps RPL models too, not sure]* Produce the shortest single-statement command-line expression which when executed outputs this line:

0 1 2 3 4 5 6 7 8 9 10

Your expression can´t use either strings/string functions or any digits in any base and must fit in a single 1-statement line (i.e., no statement concatenation via **@** in the HP-71B) less than 80 characters in length, and also can't call any program code, it must generate the ouput by itself.

I'll give my 74-character solution for the **HP-71B** in a few days but meanwhile give it a try !

Finally, a caveat: PLEASE do **NOT** include *"CODE:"* panels in your replies to this thread, as it makes it difficult for me to generate the final PDF document which will include the full thread in order to make it available online for free and for everyone in the future. I sincerely expect you'll kindly comply with this reasonable requirement but in any case I'll remove from the final PDF document any replies featuring *CODE:* panels. Thank you.

That's all. Hope you'll enjoy it !

Best regards.
V.

Find All My HP-related Materials here: **Valentin Albillo's HP Collection**

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04-01-2018, 11:45 PM **Post: #2**

Didier Lachieze
Senior Member

Posts: 1,232
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Hi Valentin, thanks for this nicely crafted challenge !

Let me start with the easy part, the first dessert:
- for the HP-71B, 8 bytes : 1 DISP MAXREAL*EPS
- for the HP-25, 7 bytes :
01 FIX 9
02 .
03 3
04 1/x
05 3
06 x
07 GTO 00

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04-02-2018, 01:24 AM (This post was last modified: 04-02-2018 07:00 PM by rprosperi.) **Post: #3**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

For Desert #2:

SGN(EXPONENT(EPS))*RAD(ANGLE(SGN(EXPONENT(EPS)),EPS))

53 chars and 23 bytes with line number.

It works and meets the criteria, but it's still waaay too long.

Will keep looking for shorter ways to generate -1...

Edit 1:

Shorter, but still long:

SGN(DVZ)*RAD(ANGLE(SGN(DVZ),EPS))

--Bob Prosperi

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04-02-2018, 02:38 AM **Post: #4**

Paul Dale
Senior Member

Posts: 1,662
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Desert 3.

$F(X) = X + 10^{90}$.
$G(X) = X - 10^{90}$.

G(F(X)) is zero for $|x| < 20$. It's correct only at X=0. The smallest X where the difference is > 2% will be the largest negative number allowed in the small range around zero i.e. -19.999...999. The smallest in absolute will be the smallest positive X such that X - X/50 doesn't underflow.

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04-02-2018, 11:18 AM **Post: #5**

pier4r
Senior Member

Posts: 2,067
Joined: Nov 2014

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Valentin Albillo Wrote:** ⇒ (04-01-2018 10:08 PM)
> Finally, a caveat: PLEASE do **NOT** include *"CODE:"* panels in your replies to this thread, as it makes it difficult for me to generate the final PDF document which will include the full thread in order to make it available online for free and for everyone in the future. I sincerely expect you'll kindly comply with this reasonable requirement but in any case I'll remove from the final PDF document any replies featuring *CODE:* panels. Thank you.

Just an observation. Why do you say "code" shouldn't be included? If you see the thread with the printable version (at the end of the thread there is a link) listing in code are not bad when properly formatted.

See for example
http://www.hpmuseum.org/forum/printthread.php?tid=8555

search for "listHeadIterate". It is pretty nice.

Wikis are great, Contribute :)

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04-02-2018, 05:37 PM (This post was last modified: 04-02-2018 07:29 PM by J-F Garnier.) **Post: #6**

J-F Garnier
Senior Member

Posts: 461
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Desserts #1 and #3 (related solutions), on HP71 w/ Math ROM or Pioneer machines.

#1:
1 DISP TANH(14)*10
[edited: not an efficient solution of the challenge, of course]

#3
F(X)=TANH
G(X)=ATANH
X=14.5

J-F

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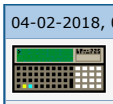
04-02-2018, 08:53 PM **Post: #7**



J-F Garnier
Senior Member

Posts: 461
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Dessert #4 [HP71 specific]

One 74-char. solution:
INX-INX;INX=INX;INX-OVF;INX-DVZ;-INX;-UNF;-OVF;-DVZ;-IVL;-INX-UNF;-INX-OVF

J-F

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04-02-2018, 09:17 PM (This post was last modified: 04-02-2018 09:19 PM by Dieter.) **Post: #8**

Dieter
Senior Member

Posts: 2,397
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Mike (Stgt) Wrote:** ⇒ (04-02-2018 12:44 AM)

[9,999999999]
4 bytes if I count corretly.

Yes, this does it on a 10-digit calculator – I had the same idea. ;-)
But it doesn't work with 12 digits.

> **Mike (Stgt) Wrote:** ⇒ (04-02-2018 12:44 AM)
> (Sorry, not using *code:* multiple blanks get lost.)

You may use hard blanks (Alt+0160):

```
01-       1  1
02-       0  0
03-      11  SQRT
04-   42 11  x^2
```

But, as already mentioned, "view a printable version" at the page bottom expands all code boxes, so such tricks should not be required.

Dieter

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04-02-2018, 09:53 PM **Post: #9**

J-F Garnier
Senior Member

Posts: 461
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

After the desserts, back to the main course!

I have a nice little HP71 program that is able to output the (assumed) correct result for each of the six test numbers.
However, I will not publish my very clever program here, just the results as NO or YES:
8082737769637879 NO
896983736577657873676980827377 69 YES
677977807983738469788577666982 NO
7365778082737769847979 YES
6779778079837384696583876976 76 NO
7378686969688082737769 YES

:-)
J-F

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04-02-2018, 10:06 PM **Post: #10**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **J-F Garnier Wrote:** ⇒ (04-02-2018 08:53 PM)
> Dessert #4 [HP71 specific]
>
> One 74-char. solution:
> INX-INX;INX=INX;INX-OVF;INX-DVZ;-INX;-UNF;-OVF;-DVZ;-IVL;-INX-UNF;-INX-OVF
>
> J-F

Brilliant! This must be the same result as Valentin's.
You have me digging into parts of the 71 manual that are not familiar...

--Bob Prosperi

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04-02-2018, 10:53 PM **Post: #11**

Gerson W. Barbosa
Senior Member

Posts: 1,361
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **rprosperi Wrote:** ⇒ (04-02-2018 01:24 AM)
> Shorter, but still long:
>
> SGN(DVZ)*RAD(ANGLE(SGN(DVZ),EPS))

Slightly shorter and still too long:

RAD(INX*ANGLE(EPS,EPS))

Both ANGLE and RAD are listed under Trigonometric Operations in the Keyword Index, though.

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04-02-2018, 11:06 PM **Post: #12**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Gerson W. Barbosa Wrote:** ⇒ (04-02-2018 10:53 PM)
> Slightly shorter and still too long:
>
> RAD(INX*ANGLE(EPS,EPS))
>
> Both ANGLE and RAD are listed under Trigonometric Operations in the Keyword Index, though.

You beat me Gerson, I was just exploring INX (JFG's post was an excellent hint!).

I suspect by 'no trig functions' Valentin was implying SIN/COS/etc. but you could be right. We have to wait for a judge's ruling on that, but I'll keep digging.)

--Bob Prosperi

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04-02-2018, 11:13 PM **Post: #13**

Didier Lachieze
Senior Member

Posts: 1,232
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Gerson W. Barbosa Wrote:** ⇒ (04-02-2018 10:53 PM)
> > **rprosperi Wrote:** ⇒ (04-02-2018 01:24 AM)
> > Shorter, but still long:
> >
> > SGN(DVZ)*RAD(ANGLE(SGN(DVZ),EPS))
>
> Slightly shorter and still too long:
>
> RAD(INX*ANGLE(EPS,EPS))
>
> Both ANGLE and RAD are listed under Trigonometric Operations in the Keyword Index, though.

Nice solutions, and I'm learning new HP-71 tricks with this challenge. Unfortunately they work in Degrees but not in Radians angular mode.

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04-02-2018, 11:19 PM **Post: #14**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Didier Lachieze Wrote:** ⇒ (04-02-2018 11:13 PM)
> > **Gerson W. Barbosa Wrote:** ⇒ (04-02-2018 10:53 PM)
> > Slightly shorter and still too long:
> >
> > RAD(INX*ANGLE(EPS,EPS))
> >
> > Both ANGLE and RAD are listed under Trigonometric Operations in the Keyword Index, though.
>
> Nice solutions, and I'm learning new HP-71 tricks with this challenge. Unfortunately they work in Degrees but not in Radians angular mode.

Indeed, the 71 has lots of these kinds of tricks buried deep inside.

6 bytes means Valentin found a solution with only 3 XROM (function) calls... so there are clearly still some tricks hidden

--Bob Prosperi

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04-03-2018, 03:17 PM **Post: #15**

Gerson W. Barbosa
Senior Member

Posts: 1,361
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **rprosperi Wrote:** ⇒ (04-02-2018 11:06 PM)
> I suspect by 'no trig functions' Valentin was implying SIN/COS/etc. but you could be right. We have to wait for a judge's ruling on that, but I'll keep digging.)

If RAD is allowed then RAD(UNF*OVF*OVF) does the trick, regardless the angle mode.

(Using other people's ideas only, yours included)

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04-03-2018, 09:47 PM **Post: #16**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Gerson W. Barbosa Wrote:** ⇒ (04-03-2018 03:17 PM)
> If RAD is allowed then RAD(UNF*OVF*OVF) does the trick, regardless the angle mode.

Cool!

String length is right, though byte count is higher (11 bytes with line number, I think 8 for just the expression).

Valentin is laughing now... can you hear it?

--Bob Prosperi

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04-03-2018, 10:05 PM (This post was last modified: 04-03-2018 10:06 PM by Gerson W. Barbosa.) **Post: #17**

Gerson W. Barbosa
Senior Member

Posts: 1,361
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **rprosperi Wrote:** ⇒ (04-03-2018 09:47 PM)
> [quote='Gerson W. Barbosa' pid='94428' dateline='1522765035']
>
> String length is right, though byte count is higher (11 bytes with line number, I think 8 for just the expression).
>
> Valentin is laughing now... can you hear it?

On the other hand, Valentin said "1 DISP itself takes 5 bytes", so I assume the expression takes 6 bytes, unless I'm wrong, of course.

Six byte and 16 characters for -pi is indeed awesome. I would need much more just for pi :-)

```
LN(SQRT(SQRT((305^3+25^3+5^3+5)/(4^3+3^3+2^3))))
```

16*3 characters and 6*6 bytes

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04-03-2018, 10:31 PM **Post: #18**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Gerson W. Barbosa Wrote:** ⇒ (04-03-2018 10:05 PM)
> On the other hand, Valentin said "1 DISP itself takes 5 bytes", so I assume the expression takes 6 bytes, unless I'm wrong, of course.
>
> Six byte and 16 characters for -pi is indeed awesome. I would need much more just for pi :-)
>
> ```
> LN(SQRT(SQRT((305^3+25^3+5^3+5)/(4^3+3^3+2^3))))
> ```
>
> 16*3 characters and 6*6 bytes

Sorry, I missed that note inside Desert #1 when I skipped straight to Desert #2. I was not sure how many bytes a line number takes, but it looks like it's 3.

So then yes, of course this is the answer.

Good job team! I wonder if Valentin awards partial credit?

--Bob Prosperi

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04-04-2018, 01:08 AM **Post: #19**

Valentin Albillo
Senior Member

Posts: 636
Joined: Feb 2015
Warning Level: 0%

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

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Hi all,

First of all thanks for the overwhelming interest in my humble *SSMC#22*, I'm very grateful for it.

I'll post my original solutions to *Main Course* and *4 Desserts* within two days (next April, 5) so you've still got time to solve them all, but meanwhile I'll address here some of the things you either commented or asked. Read on:

> **Didier Lachieze Wrote:**
> Hi Valentin, thanks for this nicely crafted challenge !

You're welcome, thanks for your appreciation.

> **pier4r Wrote:**
> Just an observation. Why do you say "code" shouldn't be included? If you see the thread with the printable version (at the end of the thread there is a link) listing in code are not bad when properly formatted.

You may be right but for this challenge I'll stick to my plea not to use it. I make change my mind though after I do some tests. Thanks for pointing this out to me.

> **Mike (Stgt) Wrote:**
> "At one's ease"? So the following determinations are not too serious? Please explain.
> ...
> "We may say", why not "we say"?

Please, Mike (Stgt), English is not my native language and I'm doing what I can with it so please cut me some slack, will you ?

> **Gerson W. Barbosa Wrote:**
> Both ANGLE and RAD are listed under Trigonometric **Operations** in the Keyword Index, though.

They're not trigonometric ***functions*** so they're perfectly legal.

> **rprosperi Wrote:**
> Valentin is laughing now... can you hear it?
> ...
> Good job team! I wonder if Valentin awards partial credit?

Indeed I was, you all are quite funny and it's a pleasure to read your attempts (and eventual success!). And yes, I award credit to all involved.

That's all, see you next April 5.
Best regards and keep on trying till you get all solved, *Main Course* & *4 Desserts*.
V.
.

Find All My HP-related Materials here: **Valentin Albillo's HP Collection**

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04-04-2018, 03:38 AM (This post was last modified: 04-04-2018 03:39 AM by Gerson W. Barbosa.) **Post: #20**

Gerson W. Barbosa
Senior Member

Posts: 1,361
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **rprosperi Wrote:** ⇒ (04-03-2018 10:31 PM)
> So then yes, of course this is the answer.
>
> Good job team! I wonder if Valentin awards partial credit?

`OVF*OVF*RAD(UNF)` is another variation. But Dessert #2 won't be over until -Pie/100 and -Pie/10000 are served.

`RAD(INX+UNF)/UNF` returns Pie/100, but we need -Pie/100. It looks like Pie and wine don't match :-)

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04-04-2018, 08:08 AM (This post was last modified: 04-04-2018 08:29 AM by Didier Lachieze.) **Post: #21**

Didier Lachieze
Senior Member

Posts: 1,232
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **J-F Garnier Wrote:** ⇒ (04-02-2018 09:53 PM)
> After the desserts, back to the main course!
>
> I have a nice little HP71 program that is able to output the (assumed) correct result for each of the six test numbers.
> However, I will not publish my very clever program here, just the results as NO or YES:

Thanks J-F for not spoiling the solution.

This morning I solved the main course with some lateral thinking and a little help from Parzival. It was a pure moment of joy to find the solution!

I have now a 37-byte program in my 42S which provides the result for each of the 6 test numbers. I will publish it tomorrow (April 5 by 8PM CET) to leave some more time for others to find the solution.

Thanks again Valentin, you made my day. This is a marvelously crafted challenge

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04-05-2018, 08:01 AM **Post: #22**

J-F Garnier
Senior Member

Posts: 461
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Gerson W. Barbosa Wrote:** ⇒ (04-04-2018 03:38 AM)
> `OVF*OVF*RAD(UNF)` is another variation. But Dessert #2 won't be over until -Pie/100 and -Pie/10000 are served.

Still room for the last pieces of dessert?
RAD(OVF*OVF%UNF) -> -Pi/100
RAD(OVF%OVF%UNF) -> -Pi/10000

J-F

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04-05-2018, 01:35 PM (This post was last modified: 04-06-2018 05:01 PM by Gerson W. Barbosa.) **Post: #23**

Gerson W. Barbosa
Senior Member

Posts: 1,361
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **J-F Garnier Wrote:** ⇒ (04-05-2018 08:01 AM)
> Still room for the last pieces of dessert?
> RAD(OVF*OVF%UNF) -> -Pi/100
> RAD(OVF%OVF%UNF) -> -Pi/10000

Very nice!

Skipped the main course and took just a tiny bit of pie. That's what I call being on a diet :-)
Thank you all for the HP-71B tricks!

Gerson.

Edited for Grammar.

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04-05-2018, 07:06 PM **Post: #24**

Didier Lachieze
Senior Member

Posts: 1,232
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

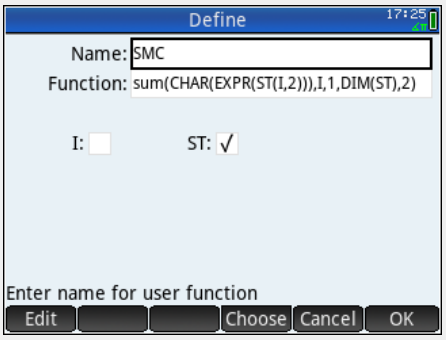
It took me quite a long time to find the solution to the main course. With my limited knowledge of primality tests I was going nowhere until I took a step back, looked at the overall challenge and started to think to the date of the challenge posting, which led me to Parzival's Easter Eggs hunt in "Ready Player One", the latest Spielberg movie. At that point I thought: "maybe Valentin has cleverly placed some clues to the solution in the numbers themselves", so I took a different look at the test numbers and bingo, each test number was an Easter egg !

Here is my 42s program for the main course. I managed to squeeze out one byte since yesterday, for a total of 36 bytes.
Usage: XEQ "P", enter the test number, press R/S and see the result.

```
00 { 36-Byte Prgm }
01▸LBL "P"
02 CLA
03 AON
04 PROMPT
05 AOFF
06 ALENG
07▸LBL 00
08 ATOX
09 10
10 ×
11 ATOX
12 +
13 528
14 -
15 XTOA
16 R↓
17 2
18 -
19 X>0?
20 GTO 00
```

```
21 AVIEW
22 END
```

Here is also a 48-character user function for the HP Prime: `sum(CHAR(EXPR(ST(I,2))),I,1,DIM(ST),2)`



Usage: provide the input number as a string, e.g. SMC("8082737769637879")

Note: you need first to create the variable ST (for ex. with ST:="") before defining the user function.

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04-05-2018, 07:16 PM **Post: #25**

J-F Garnier
Senior Member

Posts: 461
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Didier Lachieze Wrote:** ⇒ (04-05-2018 07:06 PM)
> Here is my 42s program for the main course. ..

The program can even run on a 41 (with x-functions) for the three shortest test numbers (<=24 digits).
With Free42, you can directly paste the numbers into the ALPHA register.
Watch the results!

Thanks to Valentin for this nice puzzle !

J-F

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04-06-2018, 05:08 AM **Post: #26**

Valentin Albillo
Senior Member

Posts: 636
Joined: Feb 2015
Warning Level: 0%

[VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special - My Solutions

Hi all,

As always, thank you very much for the high degree of participation in my ***SSMC#22 April 1st 2018 Spring Special*** and most importantly the high quality of your various inputs, whether individual or *"as a team"* (I like the concept !), which indeed managed to find the correct solutions to all parts of it, sometimes actually producing my exact original solution and at other times producing an equivalent variation thereof.

These are my original solutions plus assorted comments:

Main Course:

This is my original version for the **HP-71B**, an UDF (User-Defined Function, 2 lines, 72 bytes) which accepts as argument the number whose primality or compositeness we want to know (as a string, to cater with inputs more than 12 digits long) and outputs the number's answer to that question.

```
1 DEF FNS$(N$) @ S$="" @ FOR I=1 TO LEN(N$) STEP 2
2 S$=S$&CHR$(VAL(N$[I,I+1])) @ NEXT I @ FNS$=S$ @ END DEF
```

Speaking of which, there are any number of powerful algorithms to check a number for primality but I think that my approach is quite novel, namely:

"Why not ask the number itself if it's prime or composite ? Surely it should know !".

The above UDF implements just that approach. Let's see how it fares with the six test numbers:

```
>FNS$("8082737769637879")

      PRIME?NO                          {correct, composite divisible by 5701}

>FNS$("896983736577657873676980827377 69")

      YESIAMANICEPRIME                  {correct, nice or not it's indeed a prime}
```

```
      >FNS$("67797780798373846978857766698 2")

            COMPOSITENUMBER                     {obviously composite}

      >FNS$("7365778082737769847979")

            IAMPRIMETOO                         {correct, it's a prime}

      >FNS$("677977807983738469658387697676")

            COMPOSITEASWELL                     {obviously composite}

      >FNS$("7378686969688082737769")

            INDEEDPRIME                         {correct, it's a prime}
```

Of course these are not the only numbers who truthfully answer when asked, there are *billions and billions* which will obligue as well, for instance:

```
      FNS$("83797769328082737769")              -> SOME PRIME         { correct, it's a prime }
      FNS$("667371328082737769")                -> BIG PRIME          { ditto }
      FNS$("65768379328082737769")              -> ALSO PRIME         { ditto }
      FNS$("7339776580827377 6949484837")       -> I'MAPRIME100%      { ditto }
      FNS$("736577787984808273776983798 28289") -> IAMNOTPRIMESORRY   { composite, divisible by 43^2 }
      FNS$("677977807983738469")                -> COMPOSITE          { ditto, divisible by 79 }
      FNS$("787984677977807983738469333333333") -> NOTCOMPOSITE!!!!   { correct, it's an enthusiastic prime }
      FNS$("91808273776993")                    -> [PRIME]            { correct, it's a prime }
      FNS$("787932837989328082737779")          -> NO SOY PRIMO       { Spanish composite, div. by 2663 }
      FNS$("80827377696332787933")              -> PRIME? NO!         { composite, divisible by 3 }
      FNS$("687386738373667669668951")          -> DIVISIBLEBY3       { ditto }
```

Other numbers do care to answer but it seems they're not that sure about their own status:

```
      FNS$("7879843283858269")                  -> NOT SURE           { composite, divisible by 9601 }
      FNS$("8773837232733275786987")            -> WISH I KNEW        { ditto , divisible by 7669 }
      FNS$("89798532846976763277 69")           -> YOU TELL ME        { ditto , divisible by 3 }
      FNS$("87727932676582698363")              -> WHO CARES?         { ditto , divisible by 3 }
      FNS$("6669658483327769")                  -> BEATS ME           { ditto , divisible by 17 }
```

Also, still others do not even care but even seem to *resent* being asked and reply rudely:

```
      FNS$("766965866932776932657679 7869")     -> LEAVE ME ALONE     { composite, divisible by 3 }
      FNS$("7179326587658933")                  -> GO AWAY!           { ditto, divisible by 367651 }
      FNS$("6669658432738433")                  -> BEAT IT!           { ditto, divisible by 11 }
      FNS$("837279794432837279 79")             -> SHOO, SHOO         { ditto, divisible by 3 }
```

And finally, the *worst* offenders of all, some numbers do reply but only to ***lie*** *shamelessly* through their teeth !

```
      FNS$("65787984726982677977807983738469")  -> ANOTHERCOMPOSITE   { such liar ! ... you're a prime ! }
```

To be honest, the vast majority seem to be under the influence or something because they reply with *gibberish* when asked but I won't give any examples here as they're quite common and so pretty easy to find.

All in all, I'd say my groundbreaking, novel primality check it's a **great success**, don't you think ? ... XD

Also, this is my RPN version for the **HP42S** (a program, 21 steps, 39 bytes, no numbered registers or variables)

```
      00 { 39-Byte Prgm }
      01 LBL "P?"
      02 "N?"
      03 AON
      04 PROMPT
      05 ALENG
      06 2
      07 /
      08 LBL 00
      09 ATOX
      10 10
      11 X
      12 ATOX
      13 +
      14 528
      15 -
      16 XTOA
      17 Rv {roll down}
      18 DSE ST X
      19 GTO 00
      20 AVIEW
      21 END

XEQ "P?"

      N?
            8082737769637879 [R/S] -> PRIME?NO
XEQ "P?"
```

```
      N?
            896983736577657873676980827377 69 [R/S] -> YESIAMANICEPRIME
```

etc.

Dessert 1:

Shortest is (also it uses no digits, strings, or functions):

```
      1 DISP MAXREAL*EPS  (8 bytes, 8-5 = 3 bytes for the expression itself)
```

Other less efficient possibilities that people might try:

```
      1 DISP 9.99999999999       (14 bytes, 9 bytes for the expression)
      1 DISP 10-1E-11            (12 bytes, 7 bytes for the expression)
      1 DISP RAD(DEG(-INX))-OVF  (12 bytes, 7 bytes for the expression, also no digits)
      1 DISP NEIGHBOR(10,0)      (12 bytes, 7 bytes for the expression)
      1 DISP 10/3*3              (11 bytes, 6 bytes for the expression)
      1 DISP MAXREAL/1E499       (10 bytes, 5 bytes for the expression)
      1 DISP RAD(DEG(6))+4       (10 bytes, 5 bytes for the expression)
```

Dessert 2:

Shortest are (all of them 6 bytes):

```
      >RAD(OVF*UNF*OVF)

            -3.14159265359 {-Pi}

      >RAD(OVF*UNF%OVF)

            -3.14159265359E-2 {-Pi/100}

      >RAD(OVF%UNF%OVF)

            -3.14159265359E-4 {-Pi/10000}
```

and their various permutations. As I said, **RAD** is *not* a trigonometric *function*, as it's merely multiplication by a conversion factor and so it's perfectly legal, while **ANGLE** *is* a trigonometric function (a variant of the arctangent function) and so *not* legal for this challenge.

Dessert 3:

Some people offered valid F(X) and G(X) but the original I had in mind is the simple pair **TANH(X)** and **ATANH(X)**. For these functions we have:

- For the HP-71B:

```
            X      ATANH(TANH(X))     % Error
      ------------------------------------------
      10.000000      10.000037      0.000373 %
      11.000000      10.999905     -0.000867 %
      14.000000      14.162084      1.157744 %
      14.100000      14.162084      0.440313 %
      14.200000      14.162084     -0.267013 %
      14.300000      14.162084     -0.964447 %
      14.400000      14.162084     -1.652193 %
      14.500000      14.162084      2.330454 % <<< exceeds 2% absolute error
```

The *smallest value* for which % Error is greater than 2% in absolute value can be found this way:

```
      >FNROOT(10,14.5,ABS(100*(ATANH(TANH(FVAR))/FVAR-1))-2)

            14.4511062736
```

which is the correct smallest value as the relative error is:

```
      >100*(ATANH(TANH(14.4511062736))-14.4511062736)/14.4511062736

            -1.9999999995 (%)
```

i.e.: ~ 2% error, as required:

- **For the HP-11C/HP-15C** and other 10-digit calcs featuring hyperbolic functions, we may use this simple routine to explore the % error:

```
      01 LBL A
      02 ENTER
      03 TANH
      04 ATANH
      05 D% {delta %}
      06 ABS
      07 RTN

[USER] [FIX 4]

      12 [A] -> 1.1708 (%)
      12.1 [A] -> 1.9876 (%)
```

```
      12.2 [A] -> 2.7910 (%) <<< exceeds 2% absolute error
```

The *smallest value* for which *% Error* is greater than 2% in absolute value can be easily found using an **HP-15C** by solving this litte program (a variation of the above code):

```
      01 LBL A
      02 ENTER
      03 TANH
      04 ATANH
      05 D% {delta %}
      06 ABS
      07 2
      08 -
      09 RTN

[USER] [FIX 9]

      12 [ENTER] 12.2 [SOLVE A] -> 12.10152965
```

- let's check:

```
    [ENTER] [TANH] [ATANH] [D%] -> -1.999999975
```

~ 2% error, as required

- **For the HP42S**, this code allows for exploration. It's the same code as the one for the 10-digit **HP-11C**, say, but the results are the same as those for the 12-digit **HP-71B**:

```
      01 LBL A
      02 ENTER
      03 TANH
      04 ATANH
      05 %CH
      06 ABS
      07 END

      12 XEQ A -> 0.0274 (%)
      14 XEQ A -> 1.1577 (%)
      14.5 XEQ A -> 2.3305 (%) <<< exceeds 2%
```

etc.

Dessert 4:

Shortest is:

```
      >INX-INX;INX-UNF;INX-OVF;INX-DVZ;-INX;-UNF;-OVF;-DVZ;-IVL;-INX-UNF;-INX-OVF (74-char)

            0 1 2 3 4 5 6 7 8 9 10
```

and there are zillions of permutations and variations. For instance, you can get 0 by INX-INF, UNF-UNF, ..., EPS-EPS, etc. and you can get 1 by INX/INX, UNF/UNF, ..., EPS/EPS, ... and so on and so forth. None of them are less than 74-char long and I don't think a shorter solution is possible (though I'd love to be proved wrong).

Finally, as a free bonus, I'll give the factorization I discovered for the big number I gave in the prologue to the challenge, namely:

```
      55555555555555444444444444444433333333333333322222222222222222211111111111111 =

            306344115404848636966826162573 9 * 1813501639557726700682317058436863161212841 49
```

where both factors are prime, of course. To check it using my HP-71B and a very simple multiprecision multiplication UDF, just execute this:

```
      >FNM$("306344115404848636966826162573 9","1813501639557726700682317058436863161212841 49")

            55555555555555444444444444444433333333333333322222222222222222211111111111111
```

which checks Ok.

That's all. Thanks for your interest and really glad you liked it. See you in ***S&SMC#23*** ! :-)

Regards.
V.

Find All My HP-related Materials here: **Valentin Albillo's HP Collection**

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04-06-2018, 06:45 AM **Post: #27**

pier4r
Senior Member

Posts: 2,067
Joined: Nov 2014

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Let the numbers talk is a really nice idea!

Wikis are great, Contribute :)

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04-06-2018, 03:11 PM **Post: #28**

John Keith
Senior Member

Posts: 615
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Didier Lachieze Wrote:** ⇒ (04-02-2018 11:13 PM)
> Nice solutions, and I'm learning new HP-71 tricks with this challenge.

Myself as well, although I haven't used my 71B in a long time. Thank you Valentin for an interesting and fun challenge!

Though it seems like cheating, this HP49/50 program seems to meet all the rules for the main course, and it's hard to beat for size at 15.5 bytes:

<< ISPRIME? >>

John

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04-06-2018, 03:35 PM **Post: #29**

Gene
Moderator

Posts: 1,070
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Interesting challenge, Valentin!

Couple of questions on the Main Course.

1) First, how about a deeper explanation? Inquiring minds want to know.

2) The 42S version does not work for a lot of numbers, but does others, as you suggest.

Have you in a sneaky manner pre-chosen the numbers such that the approach can spit out meaningful alpha?

Don't get me wrong, that is perhaps a GREATER achievement if so. :-)

I would just like to understand better what is going on. Thanks as always...

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04-06-2018, 04:52 PM (This post was last modified: 04-06-2018 05:52 PM by Gerson W. Barbosa.) **Post: #30**

Gerson W. Barbosa
Senior Member

Posts: 1,361
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Gene Wrote:** ⇒ (04-06-2018 03:35 PM)
> I would just like to understand better what is going on.

The Dec and Char columns in this ASCII table can be used to hand-decode the messages.

ASCII Table

Dec	Hex	Oct	Char	Dec	Hex	Oct	Char	Dec	Hex	Oct	Char	Dec	Hex	Oct	Char
0	0	0		32	20	40	[space]	64	40	100	@	96	60	140	`
1	1	1		33	21	41	!	65	41	101	A	97	61	141	a
2	2	2		34	22	42	"	66	42	102	B	98	62	142	b
3	3	3		35	23	43	#	67	43	103	C	99	63	143	c
4	4	4		36	24	44	$	68	44	104	D	100	64	144	d
5	5	5		37	25	45	%	69	45	105	E	101	65	145	e
6	6	6		38	26	46	&	70	46	106	F	102	66	146	f
7	7	7		39	27	47	'	71	47	107	G	103	67	147	g
8	8	10		40	28	50	(	72	48	110	H	104	68	150	h
9	9	11		41	29	51	)	73	49	111	I	105	69	151	i
10	A	12		42	2A	52	*	74	4A	112	J	106	6A	152	j
11	B	13		43	2B	53	+	75	4B	113	K	107	6B	153	k
12	C	14		44	2C	54	,	76	4C	114	L	108	6C	154	l
13	D	15		45	2D	55	-	77	4D	115	M	109	6D	155	m
14	E	16		46	2E	56	.	78	4E	116	N	110	6E	156	n
15	F	17		47	2F	57	/	79	4F	117	O	111	6F	157	o
16	10	20		48	30	60	0	80	50	120	P	112	70	160	p
17	11	21		49	31	61	1	81	51	121	Q	113	71	161	q
18	12	22		50	32	62	2	82	52	122	R	114	72	162	r
19	13	23		51	33	63	3	83	53	123	S	115	73	163	s
20	14	24		52	34	64	4	84	54	124	T	116	74	164	t
21	15	25		53	35	65	5	85	55	125	U	117	75	165	u
22	16	26		54	36	66	6	86	56	126	V	118	76	166	v
23	17	27		55	37	67	7	87	57	127	W	119	77	167	w
24	18	30		56	38	70	8	88	58	130	X	120	78	170	x
25	19	31		57	39	71	9	89	59	131	Y	121	79	171	y
26	1A	32		58	3A	72	:	90	5A	132	Z	122	7A	172	z
27	1B	33		59	3B	73	;	91	5B	133	[	123	7B	173	{
28	1C	34		60	3C	74	<	92	5C	134	\	124	7C	174	|
29	1D	35		61	3D	75	=	93	5D	135	]	125	7D	175	}
30	1E	36		62	3E	76	>	94	5E	136	^	126	7E	176	~
31	1F	37		63	3F	77	?	95	5F	137	_	127	7F	177	

I've manually encoded three messages, but none have worked. It should not be too difficult, however, to find meaningful numbers using a program that combines both an encoder and a primality tester. That's what Valentin probably has used.

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04-06-2018, 07:12 PM **Post: #31**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Gene Wrote:** ⇒ (04-06-2018 03:35 PM)
> I would just like to understand better what is going on. Thanks as always...

Boy, are you gonna wince hard with a loud DOH!

--Bob Prosperi

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04-06-2018, 07:54 PM **Post: #32**

Gene
Moderator

Posts: 1,070
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

lol. No, I saw the character value manipulation going on, which is also of course why some values such as our favorite 10 digit largest prime 9999 9999 67 spit out only nonsense. :-)

I'm just curious if Valentin really waded in backward from various text outputs and really constructed the original numbers that way. I suppose so, but wanted to ask.

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04-06-2018, 08:32 PM **Post: #33**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Valentin Albillo Wrote:** ⇒ (04-06-2018 05:08 AM)
>
> **Hi all**,
>
> As always, thank you very much for the high degree of participation in my ***SSMC#22 April 1st 2018 Spring Special*** and most importantly the high quality of your various inputs, whether individual or *"as a team"* (I like the concept !), which indeed managed to find the correct solutions to all parts of it, sometimes actually producing my exact original solution and at other times producing an equivalent variation

thereof.

These are my original solutions plus assorted comments:

Thanks for the Easter treat with your SSMC#22 Valentin, as always very educational and this time even more fun than usual.

For the main course, I only got as far as noticing the examples all had an even number of digits. If I noticed that this was listed on April 1st, that may have moved me closer to figuring it out, but unlike Didier, with whom I share having no background in factoring Primes, I very quickly moved on to desert.

The conditions for Desert #2 pointed me quickly to the many unique Functions in the 71, but as you saw, that took a team effort to wrestle down.

Desert #4's solution is also quite interesting and satisfying; I had just started to explore some of these, having (re-)learned the nature of these flag functions on Desert #2, but didn't get far before JFG's brilliant reply.

A question for you true 71B masters: I thought all function calls (similar to '41 XROM) were 2 bytes long: 1) the LEX ID and 2) the particular Fn in that LEX (each ranging up to 255, so needing a full byte).

Yet, the answer to D#2, "RAD(OVF*UNF*OVF)" is clearly 4 functions but only 6 bytes. Hmph?!

I don't want to derail this too far from the main topic, but since 'size counts' I thought it may be relevant to ask here.

--Bob Prosperi

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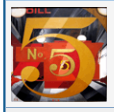
04-07-2018, 02:05 AM **Post: #34**



Valentin Albillo
Senior Member

Posts: 636
Joined: Feb 2015
Warning Level: 0%

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

.

Hi all,

Thanks a lot for the extra feedback, much appreciated (actually your feedback it's the fuel that energizes me to post challenges and other materials !). As I did three days ago I'll address here the various things you recently either commented or asked. Let's begin:

> **pier4r Wrote:**
> Let the numbers talk is a really nice idea!

Thanks ! As far as I know, it's a novel concept, I've never seen it before.

> **Mike (Stgt) Wrote:**
> Thank you for this flock of easter eggs! In addition I learned that the HP11C does hyperbolic functions. Alas my question if ->H and the inverse ->H.MS was valid functions twosome stays unanswered.

The **HP-11C** does indeed hyperbolics (very useful to solve one-real-root cubic equations, by the way). And yes, your twosome **->H** and **->H.MS** are indeed perfectly valid solutions for ***Dessert 3*** (or equivalently **HR** and **HMS** functions in the **HP-71B**). I didn't mention them specifically in my solutions but I did say *"Some people offered valid F(X) and G(X)"*, which included them of course. Congratulations for finding them, good lateral thinking.

> **John Keith Wrote:**
> Thank you Valentin for an interesting and fun challenge!
> Though it seems like cheating, this HP49/50 program seems to meet all the rules for the main course, and it's hard to beat for size at 15.5 bytes:
>
> << ISPRIME? >>

Thanks for your appreciation and kind comments. As for the `<< ISPRIME? >>` program I concur that it's quite short but, as they say, *"the proof of the pudding is in the eating"* so: What results does it give when applied to the six test numbers I gave ?

> **Gene Wrote:**
> Interesting challenge, Valentin!
> Couple of questions on the Main Course.
>
> 1) First, how about a deeper explanation? Inquiring minds want to know.
> [...]
> I would just like to understand better what is going on. Thanks as always...

Thanks for your continued appreciation, Gene, but my explaining it all would ruin the magic and in fact if I told you I'd have to kill you. :-D

> **rprosperi Wrote:**
> Thanks for the Easter treat with your SSMC#22 Valentin, as always very educational and this time even more fun than usual.

Thak you very much, I'm happy to know that you find them educational and fun, that's my goal. I learned a lot while having lots of fun while reading Martin Gardner's *Mathematical Recreations* series of books and since then I've always thought that having fun inmensely enhances

learning.

> **Quote:**
> The conditions for Desert #2 pointed me quickly to the many unique Functions in the 71, but as you saw, that took a team effort to wrestle down.

Hehe, as I said, I like the concept of solving challenges *as a team*, well done.

> **Quote:**
> A question for you true 71B masters: I thought all function calls (similar to '41 XROM) were 2 bytes long: 1) the LEX ID and 2) the particular Fn in that LEX (each ranging up to 255, so needing a full byte).
>
> Yet, the answer to D#2, "RAD(OVF*UNF*OVF)" is clearly 4 functions but only 6 bytes. Hmph?!

Well, **RAD(OVF*UNF*OVF)** if one single-parameter function (**RAD**), three parameterless functions (i.e.: "constants"), **OVF**, **UNF**, **OVF**, and two arithmetic operators (*****). Each of them is 1-byte so 1+3+2 = 6 bytes.

As for all function calls being 2-byte, that's not the case. There are 1-byte functions and there are 4-byte functions, etc. For instance:

1 DISP is 5 bytes
1 DISP **1** is 6 bytes (the **1** is 1-byte)
1 DISP **LOG**(1) is 7 bytes (**LOG** is 1-byte)
1 DISP **LN**(1) is 7 bytes (**LN**, an alternate spelling of **LOG**, is also 1-byte)
1 DISP **LOG10**(1) is 7 bytes (**LOG10** is also 1-byte)
1 DISP **LGT**(1) is 10 bytes (**LGT**, an alternate spelling of **LOG10**, is 4 bytes)
1 DISP **LOGP1**(1) is 10 bytes (**LOGP1** is also 4 bytes)
1 DISP **LOG2**(1) is 10 bytes (**LOG2** is in the **Math ROM** and it's also 4 bytes)

so you see, in the above examples there are mainframe 1-byte functions, mainframe 4-byte functions, and external 4-byte functions. The mainframe 4-byte functions are the ones *less used* (**LOG10** and **LGT** are the identical function but the former is 1-byte while the latter is 4-byte).

Something similar happens with the exponential functions, **EXP** is 1-byte while **EXPM1** is 4-bytes. As for functions in the **Math ROM** we also have that **DET** is 4-byte and **DET(A)** is 5-byte (one extra byte for the **A**). **FOUR** is also 4-byte (self-describing, it seems), **TRN** is 4-byte as well, ditto for **SYS**, and so on (these last three also need a **1 MAT A=**, which is 8-byte in itself, plus the bytes needed by their argument(s)

I could go on but you get the idea and it's quite easy to either experiment using **CAT** or a little routine using **PEEK$** to display the length and tokenization of an arbitrary program line.

Again, thanks to all and best regards.
V.
.

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04-07-2018, 03:32 AM **Post: #35**

rprosperi
Senior Member

Posts: 4,439
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

> **Valentin Albillo Wrote:** ➡ (04-07-2018 02:05 AM)
> As for all function calls being 2-byte, that's not the case. There are 1-byte functions and there are 4-byte functions, etc. For instance:
>
> **1 DISP** is 5 bytes
> 1 DISP **1** is 6 bytes (the **1** is 1-byte)
> 1 DISP **LOG**(1) is 7 bytes (**LOG** is 1-byte)
> 1 DISP **LN**(1) is 7 bytes (**LN**, an alternate spelling of **LOG**, is also 1-byte)
> 1 DISP **LOG10**(1) is 7 bytes (**LOG10** is also 1-byte)
> 1 DISP **LGT**(1) is 10 bytes (**LGT**, an alternate spelling of **LOG10**, is 4 bytes)
> 1 DISP **LOGP1**(1) is 10 bytes (**LOGP1** is also 4 bytes)
> 1 DISP **LOG2**(1) is 10 bytes (**LOG2** is in the **Math ROM** and it's also 4 bytes)
>
> so you see, in the above examples there are mainframe 1-byte functions, mainframe 4-byte functions, and external 4-byte functions. The mainframe 4-byte functions are the ones *less used* (**LOG10** and **LGT** are the identical function but the former is 1-byte while the latter is 4-byte).

Thanks for clarifying, I have been exploring this exact thing today, editing line 1, using CAT to check, edit again, CAT again, etc. Very illuminating! I was getting what I thought were truly odd results, but your well-chosen examples show the storage needed for varying function statements is more subtle and complex than I recalled; alternate names requiring different bytes is unexpected too.

As for alternate names, presumably included for familiarity to different users, while **LN** for **LOG** makes sense, **LOGT** for **LOG10** seems rather odd; is this commonly used in Math research, I never encountered it in Engineering.

--Bob Prosperi

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04-07-2018, 11:59 AM **Post: #36**

Ángel Martin
Senior Member

Posts: 1,181
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Valentin Albillo Wrote: ⇒ (04-04-2018 01:08 AM)

> **Mike (Stgt) Wrote:**
> "At one's ease"? So the following determinations are not too serious? Please explain.
> ...
> "We may say", why not "we say"?

Please, Mike (Stgt), English is not my native language and I'm doing what I can with it so please cut me some slack, will you ?

The use of "may" in this very sentence is completely appropriate even if you mean it as a certainty. In fact it's a resource used by many native speakers as well , so Valentin is right on target also on the linguistic side.

The error made frequently (usually by non-native speakers) is to interpret language in a literal manner - which it is not, unless of course you're writing a legal text or a technical procedure (and even there it's flexible).

FWIW, this doesn't add value to the contents of the thread (which is a highly enjoyable contribution), but splitting hairs is a nice pastime for some.

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04-07-2018, 07:02 PM **Post: #37**

John Keith
Senior Member

Posts: 615
Joined: Dec 2013

RE: [VA] Short & Sweet Math Challenge #22: April 1st, 2018 Spring Special

Valentin Albillo Wrote: ⇒ (04-07-2018 02:05 AM)

> **John Keith Wrote:**
> Thank you Valentin for an interesting and fun challenge!
> Though it seems like cheating, this HP49/50 program seems to meet all the rules for the main course, and it's hard to beat for size at 15.5 bytes:
>
> << ISPRIME? >>

Thanks for your appreciation and kind comments. As for the `<< ISPRIME? >>` program I concur that it's quite short but, as they say, *"the proof of the pudding is in the eating"* so: What results does it give when applied to the six test numbers I gave ?

.

It returns 1 for numbers that are prime, and 0 for numbers that are composite. The results are correct for all 6 numbers in your challenge.

I meant my "solution" to be facetious since ISPRIME? is a built-in function. I did write a couple of ASCII-based programs but they weren't very impressive (87 bytes, 59.5 bytes if external libraries are allowed).

John

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