

Welcome back, **Valentin Albillo**. You last visited: Today, 02:03 ([User CP](#) — [Log Out](#))
[View New Posts](#) | [View Today's Posts](#) | [Private Messages](#) (Unread 0, Total 184)

Current time: 27th July, 2023, 03:10
[Open Buddy List](#)

HP Forums / HP Calculators (and very old HP Computers) / General Forum / What's the hardest (longest-running) financial calculation?



What's the hardest (longest-running) financial calculation?

Threaded Mode | Linear Mode

2nd October, 2020, 10:28

Post: #1

EdS2

Senior Member

Posts: 525

Joined: Apr 2014

What's the hardest (longest-running) financial calculation?

I was idly wondering: which of the many functions and features of a financial calculator will take the longest time to run? (In my case it would be run on an HP30b but the various HP-12C models would be an obvious choice of machine.)

(I suppose it might be that the 30b can tackle some calculations more efficiently than the 12C. It just possibly might be that in some cases it is less efficient.)

With ref to this recent benchmarking thread:
[12C Platinum vs. 48GX vs. 50g \(Speed Test\)](#)



2nd October, 2020, 12:32

Post: #2

**HP67**

Senior Member

Posts: 672

Joined: Dec 2013

RE: What's the hardest (longest-running) financial calculation?

I'm not sure what you meant but in terms of processor speed I think I read the 30B is one of the fastest calculators ever. Still, I find the old classics faster to use than the newer models. HP guys were masters of UI. For me the 48 is faster to use than the 50 and the 12C is faster than the 30B even though the new models have much faster processors, just because of how well laid out the most used functions and menus were on the older ones.



2nd October, 2020, 14:50

Post: #3

rprosperi

Super Moderator

Posts: 5,748

Joined: Dec 2013

RE: What's the hardest (longest-running) financial calculation?

EdS2 Wrote: (2nd October, 2020 10:28)

I was idly wondering: which of the many functions and features of a financial calculator will take the longest time to run?

Solving for Interest Rate is likely the slowest among the financial features as that is inherently an iterative calculation, however it's possible that some of the statistical functions are similar or even longer. But the 20b/30b have a LOT of functions not typically found in a financial calculator so there could be others as well.



2nd October, 2020, 20:22

Post: #4

ttw

Member

Posts: 265

Joined: Jun 2014

RE: What's the hardest (longest-running) financial calculation?

As rprosperi wrote, solving for the interest rate is the hardest as there is no closed-form formula. It's also possible to have inputs that do not allow for a solution. (One gets negative rates which are possible but rare, or one can get complex solutions which are unrealistic.) It's even worse computing rate of return (essentially an interest rate) with irregular payments.

3rd October, 2020, 01:53

Post: #5



Valentin Albillo
Senior Member

Posts: 970
Joined: Feb 2015
Warning Level: 0%

RE: What's the hardest (longest-running) financial calculation?

Hi, EdS2:

EdS2 Wrote:

(2nd October, 2020 10:28)

I was idly wondering: which of the many functions and features of a financial calculator will take the longest time to run?

In terms of **built-in functionality**, the calculation of the **IRR (Internal Rate of Return)** is by far the most complex one (with computation of a long *Mortgage Amortization table* being a distant second), as it involves *solving an Nth-degree polynomial equation*, which can only be done iteratively and is fraught with problems (multiple solutions, no solution, inaccurate solutions), thus it takes a potentially long time to compute in classic calculators. *HP* had to develop new algorithms to implement it in the **HP-92 Business/Financial**, thus solving the aforementioned problems.



In terms of **algorithmic complexity** there are many extremely complex financial calculations, which require programming. One such (among many) is the **Black-Scholes** computations, just have a look at this whole page to get the idea:

[Black-Scholes model](#)

but even that is just one among many others, anything having to do with **Derivatives pricing** is usually extremely complex. Have a look at [Mathematical Finance](#) for many links and details.

Regards and have a nice weekend (and take care !).
V.

EdS2 

Senior Member

Posts: 525

Joined: Apr 2014

RE: What's the hardest (longest-running) financial calculation?

Thanks for the answers, everyone. So, finding an interest rate in a Future Value of Money problem is hard, and finding the Internal Rate of Return for a cashflow is (or might be) harder.

Valentin, your comment led me to some specific articles in HP Journal, which might be of interest to other readers (I'm sure you are already familiar with them) and which contain some sample calculations:

[Printing Financial Calculator Sets New Standards for Accuracy and Capability](#) (HP-92) October 1977, page 22

[A Handheld Business Consultant](#) (HP-18C) August 1987, page 4

"Because the Business Consultant uses the same CPU as the HP-71B Handheld Computer, its financial calculations run at least 15 times faster than those on the HP-12C."

I looked for material on the original HP-12C, but the only HP Journal article I found which directly mentions the Voyager machines is later, about the 15C:

[Scientific Pocket Calculator Extends Range of Built-in Functions](#) May 1983, page 25

and a short section on the HP-12C emulation available for the HP 150 touchscreen computer:

[Financial Calculator](#) August 1984, page 22

There's also some interesting reading in [HP Solve magazine, issue 25](#) from September 2011, about the 12C:

"...different financial calculators display different amounts. Here is the result if you use an HP-27, HP-92, HP-37, HP-38, and HP-12C = \$331,667.0067. As an aside, the new HP 10bII calculates \$331,667.00691."



 EMAIL  PM  FIND

 QUOTE  REPORT

**Valentin Albillo** 

Senior Member

Posts: 970

Joined: Feb 2015

Warning Level: 0%

RE: What's the hardest (longest-running) financial calculation?

.

Hi, **EdS2**:**EdS2 Wrote:**

(5th October, 2020 16:16)

Valentin, your comment led me to some specific articles in HP Journal, which might be of interest to other readers (I'm sure you are already familiar with them) and which contain some sample calculations:

Thanks for the links, **EdS2**, people here are sure to enjoy them.

For *built-in* functionality, you can be sure that the **IRR** computation is the *hardest*, as it involves finding a root of a usually *large* polynomial (degree **20** or more is typical and up to $\sim 1,500^{\text{th}}$ degree is possible on such a small calculator, see the details [here](#)).

And as I said, for financial calculations complexity can be *enormous*. Have a look at these two (no need to read them, just have a look from top to bottom to ascertain the complexity):

[Pricing the zero-coupon bond \(pricing of interest rate derivatives\)](#)

[Qualitative behaviour of a financial dynamical system \(variables are interest rate, investment demand, price index and average profit margin\)](#)

Regards.

V.

 PM  WWW  FIND

 EDIT   QUOTE  REPORT

RE: What's the hardest (longest-running) financial calculation?

Hi Valentin,

thanks for the links. As advised, I skimmed the heavy financial papers very lightly, and am quite relieved I don't need to study them. Your [HP-12C Serendipitous Solver](#) paper is very much to the point - thanks for that - I've read it at least a couple of times before but this is the first time for me where the runtimes are the important part.

So, to summarise from that paper, the timings for presumably an original-model 12C for various IRR computations are:
11 seconds for a 4 element cashflow (Fibonacci's cubic) (14 keypresses to enter?)
18 seconds for an 8 element cashflow with only 4 groups of terms (19 keypresses?)
3 min 20 sec for a 138 element cashflow with only 5 non-zero terms (29 keypresses?)

(Edit: Those keypress counts are in addition to a 37 step program which offers polynomial solving using the IRR feature. I imagine one could enter the cashflows directly. I put the question marks in because I might have miscounted and the number isn't critical anyway.)

That seems to me like a good range of times, suitable for benchmarking financial calculators with a range of performance!

I might start a new thread about the various offerings from HP of financial calculators.

Thanks again
Ed



<< [Next Oldest](#) | [Next Newest](#) >>

 

- [View a Printable Version](#)
- [Send this Thread to a Friend](#)
- [Subscribe to this thread](#)

User(s) browsing this thread: [Valentin Albillo](#)*