# Calculator Display Number Contest Update #1

May 4, 2009

I have received several very similar submissions and from these I will clarify what was posted. The immediate response was surprising.

First let me mention that this is not just an artificial "problem" that provides a challenge of your knowledge of numbers and mathematics. Finding a suitable number is only half of the problem. Explaining and justifying your particular choice is the other half of the problem.

Since this is a real life issue it may be helpful to think of the problem of trying to photograph a large group of machines – say 25 or more different machines. Each will turn off in ten minutes and you have to reset all of them again. That is why the process must be universal, simple, and fast.

1. **I will weigh the value of each of the two judging criteria (what and why) equally.** All but one submission only had a (what) number-function. This is short and sweet, but only half way there. This is the reason I will accept two submittals from each person. From what I have learned and written about this problem I tend to see the winning submission as being at least 2/3rds of a page in length.

   Once you have the brilliant solution be sure to explain it; how did you "discover" it, how important it is, how is the number interesting, how it is related to other possible solutions, etc. It should be interesting, educational, and fun reading. I have only received one entry that approaches this.

2. One of the questions that might arise is what makes a basic scientific calculator – the problem solution should be easily applied to just about any scientific machine. **Let's use the first such machine, the HP-35A as a basis for the function aspect.** One submittal used Hyperbolic functions. These only appeared on HP calculators in the later models.

3. Your submittal should mention the machine(s) used for the investigation as a reference point. This could be part of the "why" justification.

4. **The winning entry will be judged from the overall presentation**, but a two keystroke submission will probably win over a three keystroke submission if adequately explained. Still, a brilliant three keystroke solution could overcome the one keystroke handicap by the performance of the result with an excellent description of the result. The reader of the solution should learn something new.

5. **How thorough is your analysis?** The more thorough it is the more points you acquire – I haven't worked out how I can be as objective as possible, but a two keystroke solution will get more points than a three keystroke solution for the "what" part. I don't have the perfect solution, but a well explained and documented two keystroke solution that produces all digits 0 to 9 in a ten digit display – I doubt that there is such solution – would probably be the winner.

6. **The leading zero of a decimal number such as 1/π does not count** – 0.318309886184 . . .
   Let me explain. Many machines will not show the leading zero under certain conditions. If you must depend on a particular display mode to get your result you must set the machine in such a mode before you start AND you must explain this as part of your justification. Usually this will not change when the machine automatically shuts off and you have to reenter the number. Again this is based on real world practical considerations.

7. Since the intent is to show the display as much as possible **<u>a negative number gets an extra point compared to the same positive number with the same keystroke count.</u>** Is this even possible?

8. Considering #6 & 7 another solution might be to show the number in scientific notation so that more of the display is shown. Again, considering the real world, you may set up the machine as you wish – except for running a program or making a key assignment since these features are not available on general purpose low end of mid range HP scientific calculators.

In summary, a quick easy way to put the number into the display with as many of the zero to nine digits as possible (the what half) with the number being interesting, and well explained/justified (the why part) will be a winner.

Send me specific questions to be answered on the HHC 2009 website.

As far as I know there is no single winning solution that every brilliant user could submit and everyone would tie. Creativity is as much vital part of this contest as the number itself is.

X < > Y,

Richard