

Computing on Your Calculator

Order of operations. Remember that multiplication and division have higher precedence than addition and subtraction. For example, if we would like to divide $16 - 6$ by $3 - 1$, we should get $10 / 2 = 5$. But what happens if we enter $16 - 6 / 3 - 1$ on the calculator?

(Try it!) You will get 13. Why? Because the calculator is performing the division $6 / 3$ first. So it computes (correctly for what was entered):

$$16 - \frac{6}{3} - 1 = 16 - 2 - 1 = 13.$$

To perform the computation we originally wanted, we must tell it to perform the subtraction first. We do this by inserting parentheses:

$$(16 - 6) / (3 - 1) = 10 / 2 = 5.$$

(Try it!)

Using the Memory. When you have to compute a long, complicated expression, it is usually easier to compute portions of it separately, storing the result (without rounding) in your calculator's memory.

Example. An installment loan consists of 20 payments of \$3000 made at the end of the year. Find the present value at an APR of 7% compounded annually.

Solution. We will use the Amortization Formula on p. 385 with

$$F = \$3000$$

$$T = 20$$

$$r = 0.07$$

$$p = \frac{0.07}{1} = 0.07$$

$$q = \frac{1}{1+p} = \frac{1}{1+0.07} = \frac{1}{1.07}$$

Then

$$P = Fq \left(\frac{q^T - 1}{q - 1} \right) = 3000 \left(\frac{1}{1.07} \right) \left[\frac{\left(\frac{1}{1.07} \right)^{20} - 1}{\left(\frac{1}{1.07} \right) - 1} \right]$$

$$\approx \$31,782.04$$

rounded to the nearest penny.

Suggestion: Compute $\frac{1}{1.07}$ and without rounding,*

store it in the memory of your calculator, say as Q. Then enter

$$3000 * Q * (Q^{20} - 1) / (Q - 1)$$

all in one step. ■

*Your calculator is rounding, but probably to 50 decimal places or so.