

Section 3.4

Using a Scientific Calculator

The section is a self-study section. The purpose is to help you learn to use your scientific calculator.

There are two basic types of calculators. On one kind of calculator, you type in the number first and then press the function that you'd like the calculator to perform and then press "equals". So, if you are trying to find $\sqrt{25}$, your keystrokes would be:

$$25 \quad \sqrt{\quad} =$$

which will give 5 as the result. The square root function may be indicated above a key, rather than on a key itself. If this is the case, your keystrokes will be

$$25 \quad 2^{\text{nd}} \quad \sqrt{\quad} =$$

Throughout this section, we'll refer to these calculators as "Number First" calculators.

When using the other kind of calculator, you type in the function first, then enter the number and press equals. To find $\sqrt{25}$, your keystrokes would be:

$$\sqrt{\quad} \quad 25 \quad =$$

which will also give 5 as the result. As with the first type of calculator, the square root function may be indicated above a key, rather than on a key itself. If this is the case, your keystrokes will be

$$2^{\text{nd}} \quad \sqrt{\quad} \quad 25 \quad =$$

Throughout this section, we'll refer to these calculators as "As Written" calculators.

Before working through this section, you should verify which type of calculator you have. Note that the UH Online calculator is an "As Written" calculator.

Try some basic computation with your calculator.

Example 1: Evaluate each.

- 23.55×51.84
- $124 - 36.79$
- $12,786 + 3,5109 + 427,648 + 2,000,005$
- $1175 \div 122$

Solution:

The keystrokes should be the same for either type of calculator.

- a. $23.55 \times 51.84 = 1220.832$
- b. $124 - 36.79 = 87.21$
- c. $12,786 + 35,109 + 427,648 + 2,000,005 = 2,475,548$
- d. $1175 \div 122 \approx 9.6311$

Note, you should follow any instructions given before rounding any numbers. Whenever possible, you should avoid rounding until the very last step.

Scientific calculators should correctly follow the Order of Operations Rule:

Example 2: Evaluate $4 + 16 \div 8 \cdot 5$

Solution:

Using the Order of Operations Rule, we would first multiply and divide in the order indicated from left to right, then do the addition:

$$4 + 16 \div 8 \cdot 5 = 4 + 2 \cdot 5 = 4 + 10 = 14$$

Now, using the calculator, we'd type in

$$4 + 16 \div 8 \cdot 5$$

and get a result of 14.

The keystrokes you need to use to compute will vary depending on the type of calculator you have. There are dozens of calculators on the market, so you should refer to your user's manual to help you with more complicated computations. If you have lost your user's manual, most of them are available online. Here are some websites to help you locate an online user's manual:

Texas Instruments:

<http://education.ti.com/educationportal/downloadcenter/SoftwareHome.do?website=US&tabId=2>

Casio:

<http://www.usersmanualguide.com/casio/calculators>

Sharp:

<http://www.sharppusa.com/products/TypeManuals/0,1083,15,00.html>

Hewlett-Packard

http://office.manualsonline.com/manuals/mfg/hewlettpackard_1/hewlettpackard_1_calculator_product_list.html

If you have a different brand of calculator, try putting “(Brand Name) calculator user’s guide” in your search line, and you should find a page which lists that company’s calculators’ manuals.

After referring to your user’s guide, if you still are having trouble using your calculator, take your calculator with you to the CASA Tutoring Center and ask a tutor for help with your calculator, or see your instruction during his or her office hours.

Example 3: Evaluate each. Round to the nearest ten-thousandth (4 decimal places):

- a. $\sqrt{87}$
- b. $\sqrt[3]{51}$
- c. $(5.8)^5$
- d. $(1.3)^{-2}$
- e. $\frac{1}{\sqrt{6}}$

Solution:

- a. The correct answer rounded to four decimal places is 9.3274.
- b. The correct answer rounded to four decimal places is 3.7084.
- c. The correct answer rounded to four decimal places is 6563.5677.
- d. The correct answer rounded to four decimal places is 0.5917.
- e. The correct answer rounded to four decimal places is 0.4082.

Note that on your hand held calculator the (-) key is not the subtraction key. Look for a key with (-) written on it. Use this key to make a number negative.

However, on the UH Online Calculator that is available through casa.uh.edu, you will use the subtraction key to make an exponent negative. To make other numbers negative, you will use the (-) key.

Successful calculator computation often involves proper use of parentheses. For example, if you wish to compute $\frac{3 \cdot 5 - 4 \cdot 7}{8}$ using a calculator, you should put the entire numerator in parentheses before dividing by 8. You should enter:

$$(3 * 5 - 4 * 7) / 8$$

This will give you a correct answer of -1.625.

If you do not use the parentheses, only the 7 will be divided by 8 and your calculator will return an answer of 11.5.

Note that with some operations, the calculator automatically opens parentheses, and you need to take care to close them when that's appropriate. For example, when you want to find the square root of a number, most calculators will display $\sqrt{(\quad)}$ in preparation for you to enter the number whose square root you wish to find. Once you've entered that number, you should close the parentheses.

If you are just finding a square root, the calculator will deem the parentheses closed when you press enter.

If you wish to find a square root and then do some other computation in the same entry, you must close the square root or the calculator will assume you are still entering the radicand.

See what happens when you find $\sqrt{25}$ and don't close the parentheses. The calculator returns 5 as the answer.

Now see what happens if you want to compute $\sqrt{25} + 1$ (which we can agree is 6) and you don't close the parentheses. The calculator will return 5.09902 since it thinks you are asking it to find the square root of $25 + 1$.

Example 4: Use appropriate parentheses to calculate each:

a. $\frac{2(2 - 5^2) + 6^2}{5(3 - 2^2)^3}$

b. $\frac{8 - 4(2 + 3^2) + 2(3 - 6)^2}{-2(7 - 3^2)^3}$

c. $\sqrt{49} + 3 \cdot 2$

Solution:

- a. The correct answer is 2.
- b. The correct answer is -1.125
- c. The correct answer is 13.

On some problems, you may want to use the Store (STO) and Recall (RCL) features to do more complicated computations. You can do parts of the computation, and then store them in your calculator. When you are ready to do the final computation, you can “recall” what you have already entered and finish up the problem.

In Example 4a, you could compute the numerator and store it, compute the denominator and store it. Then to do the final computation, you would recall the numerator and divide it by the recalled denominator.

Here are the keystrokes using an “As Written” calculator (note – yours may differ slightly).

$$2 (2 - 5 ^ 2) + 6 ^ 2 = \text{STO } A$$

$$5 (3 - 2 ^ 2) ^ 3 = \text{STO } B$$

$$\text{RCL } A / \text{RCL } B =$$

Correct answer is 2.

Example 5: Compute a periodic payment using the amortization formula:

$$R = \frac{Pi}{1 - (1 + i)^{-n}} \text{ if } P = \$150000, i = 0.0175 \text{ and } n = 28.$$

Solution:

We’ll substitute the numbers into the formula and then use the calculator.

$$R = \frac{150000(0.0175)}{1 - (1 + 0.0175)^{-28}}$$

We can use the store and recall features of a scientific calculator to do the computation:

$$150000 * 0.0175 = \text{STO } A$$

$$1 - (1 + 0.0175) ^ (-28) = \text{STO } B$$

$$\text{RCL } A / \text{RCL } B =$$

Correct answer is \$6822.23

You can also use the calculator to evaluate the natural exponential function. This function is e and is usually the 2nd of the ln key. On the UH Online calculator it is the button labeled “exp.”

Example 6: Compute $e^{(4.5)(.02175)} + 3$

Solution:

The natural exponential function is one of the functions for which the calculator may open parentheses automatically. It is important that you close the parentheses once you have entered the exponent in this problem.

The correct answer is 4.1028 to four decimal places.