The lesson documents provide information about using the calculator provided with the lessons. The purpose of this supplement is to supply information about another possible technology, namely the TI-83/84 series calculator.

CAUTION: You should note that the interface for the calculator has changed in the past and may well change in the future – accordingly, some of the information given here may prove to be out of date.

Lesson 4

The starting point for all our calculations is the 2nd DISTR menu. Note that DISTR is associated with the VARS key, which is just below the arrow keys. If you key in 2nd DISTR, you get a menu that includes many distribution functions. For this discussion, the one we need is

2: normalcdf(

This will calculate the "cumulative" probability for the "normal distribution function" – the "c" in "normalcdf" stands for *cumulative*.

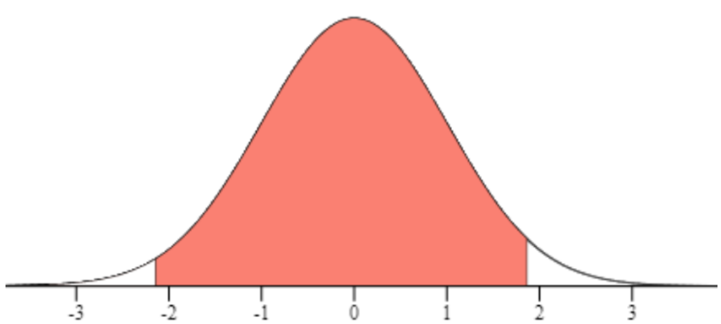
We begin by calculating probabilities based on *z* scores, using the problems from the first three examples:

$P(z \leq -2.14)$
$P(z \geq 1.87)$
$P(-2.14 \leq z \leq 1.87)$

It turns out that the third calculation is the easiest when using the TI calculator, so we begin with that.

Example 3 using calculator: Calculate $P(-2.14 \leq z \leq 1.87)$

Solution: Here is a graph indicating the area we wish to calculate:



The area/probability/proportion we need to calculate begins at $z = -2.14$ on the left, and ends at $z = 1.87$ on the right.

The format for the *normalcdf* function is $normalcdf(a, b)$. The *a* indicates the *z* score at the left edge of the area in question, which is the *z* score where the area starts. The *b* indicates the *z* score at the right edge of the area in question, which is the *z* score where the area ends. So we can think of the format as $normalcdf(left, right)$ if we wish.

For this example, we want the probability between –2.14 and 1.87, so *a* (or *left*) is –2.14 and *b* (or *right*) is 1.87. So we simply use 2nd DISTR, then scroll to the normalcdf function in the list and press ENTER, giving the following:

normalcdf(

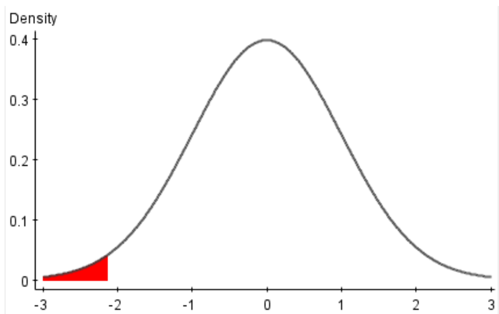
We complete the line by entering the data (*left* = –2.14, *right* = 1.87; the comma is above the 7 key):

$normalcdf(-2.14{,}1.87)$

then press ENTER. The result is 0.9531 = 95.31%.

Example 1 using calculator: Calculate $P(z \leq -2.14)$

Solution: Here is a graph indicating the area we wish to calculate:



As in the previous example, we need to use two numbers describing the area in question. It is clear that the rightmost edge of the area is at $z = -2.14$, so the value for *b* (or *right*) is -2.14. But where is the leftmost edge of the area (what is the value for *a* or *left*)?

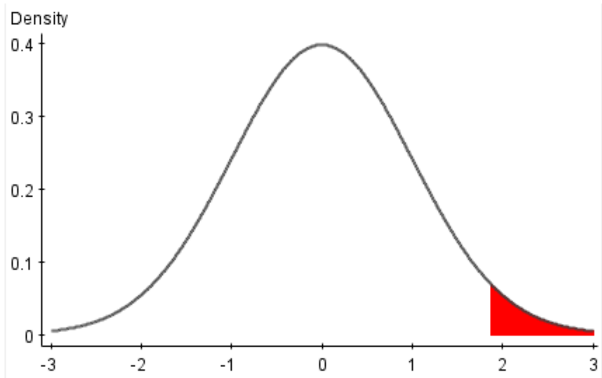
The answer is that the area extends to negative infinity. Since there is no way to enter negative infinity into the calculator, we simply choose a very large negative number. Some textbooks use -1×10^{99}, but the author of these lessons usually uses -10000, which is easier to enter:

$normalcdf(-10000, -2.14)$

The probability is 0.0162 = 1.62%.

Example 2 using calculator: Calculate $P(z \geq 1.87)$

Solution: Here is a graph:



It is clear that the leftmost edge of the area is at $z = 1.87$, so the value for *a* (or *left*) is 1.87. The area extends to plus infinity on the right, so we enter a very large number for *b* (or *right*):

$$normalcdf(1.87{,}10000)$$

The probability is 0.0307 = 3.07%.

Examples 4-6 using calculator. For adult female heights (normal with mean 65" and standard deviation 3.5"), calculate:

$P(height \leq 60)$
$P(height \geq 71)$
$P(62 \leq height \leq 70)$

Solution. Just as we did when using Table A, the first step in each problem is to calculate the *z* score for the heights. We will round the answers to four decimal places rather than two. This converts the probability about heights to a probability about z scores, which we solve just as we did for examples 1, 2, and 3. Here are the results.

Original	**In terms of *z***	**Resulting probability**
$P(height \leq 60)$	$P(z \leq -1.4286)$	0.0766 = 7.66%
$P(height \geq 71)$	$P(z \geq 1.7143)$	0.0432 = 4.32%
$P(62 \leq height \leq 70)$	$P(-0.8571 \leq z \leq 1.4286)$	0.7277 = 72.77%

Note: There is a shortcut method which your instructor may allow you to use, which bypasses the calculation of the z-score. However, we recommend that you use the method we present here, as the skills you develop will transfer quite nicely when we learn about the "*t* distribution" later in the course.