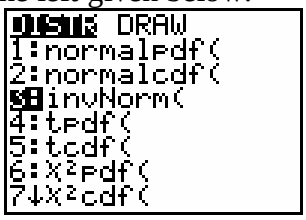
TI-83 & TI-84: Inverse "Backward" Normal Distribution Calculations and Plots

The following pages contain some instructions on the usage of the TI-83/83 Plus graphing calculator.
The example used below is taken out of David Moore's text titled "The Basic Practice of Statistics, 2nd Edition".

Example#1.18 p. 61: Scores on the SAT verbal test in recent years follow approximately the N(505,110) distribution. How high must a student score in order to place in the top 10% of all students taking the SAT?

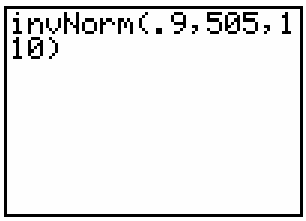
What needs to be computed is the SAT score x with area 0.1 to its right under the normal curve with mean μ=505 and standard deviation σ=110. This is the same computation as finding the SAT score x with area 0.9 to its left under the normal curve. This value of x can be computed by using the **invNorm(** command from the DISTR menu.

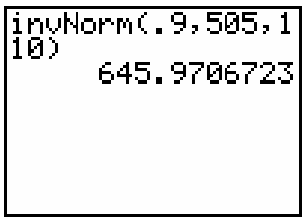
Start out from the Home screen. Press 2nd and VARS to access the DISTR menu. Press ⌄ to move the cursor down to **3:invNorm(**. At this point, your screen should look like the screen on the left given below.



Press ENTER to select **3:invNorm(** from the DISTR menu and paste it onto the Home screen. At this point, your screen should look like the screen on the right given above with the cursor blinking by the left parenthesis.

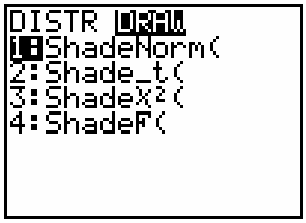
The **invNorm(** command takes three arguments. These arguments are the values of the area to the left of the SAT score x, μ, and σ. These values must be entered in that order starting from the location of the blinking cursor and each value must be followed by a coma, with the exception of the last value entered. The value of the area to the left of the SAT score x is 0.9. The value of μ is 505 and the value of σ is 110. Type in 0.9 for the area. Press , . Type in 505 for the value of μ. Press , . Type in 110 for the value of σ. Press) . At this point, your screen should look like the screen on the left given below.

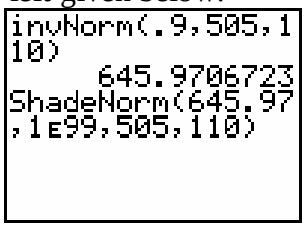




Press ENTER to see the result of the inverse normal distribution computation. Your screen should look like the screen on the right given above.
The interpretation of the above result in the context of the problem can be stated as follows. A student must score at least 645.97 to place in the top 10%.

To produce the associated normal distribution plot with the top 10% shaded one can use the **ShadeNorm(** command from the DISTR DRAW menu. Press 2nd and VARS to access the DISTR menu. Press) to move the cursor over to the DRAW menu. At this point, your screen should look like the screen on the left given below.





Press ENTER to select and paste **1:ShadeNorm(** command onto the Home screen. The **ShadeNorm(** command takes four arguments. These arguments are the values of lower bound, upper bound, μ, and σ. These values must be entered in that order starting from the location of the blinking cursor and each value must be followed by a coma, with the exception of the last value entered. Type in the lower bound value of 645.97. Press , . The value of the upper bound is a very large number to the right of 645.97 such as 10^{99}. The upper bound is entered as follows by using the scientific notation. Press 1 followed by 2nd and , . Type in 99. Press , . Type in 505 for the value of μ. Press , . Type in 110 for the value of σ. Press) . Your screen should look like the screen on the right given above.

Press WINDOW to set the appropriate WINDOW menu settings given on the left below. Be sure to have all the plots turned off. Press 2nd and MODE to quit from the WINDOW menu and go back to the Home screen.

Press ENTER to see the normal distribution plot with the top 10% shaded. Your screen should look like the screen on the right given below.