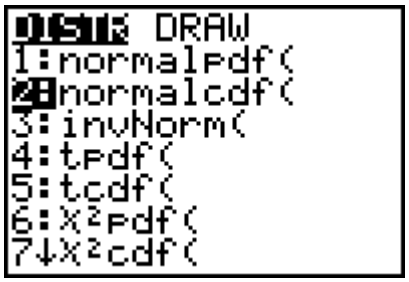
Using The TI-83 to Find Normal Probabilities

You can use the TI-83 calculator to find the area (or probability) between points *a* and *b* under a normal distribution curve with mean μ and standard deviation σ.

Hit 2ND and DISTR (above the VARS button) buttons. Arrow down and select 2: normalcdf(which stands for normal cumulative density function.

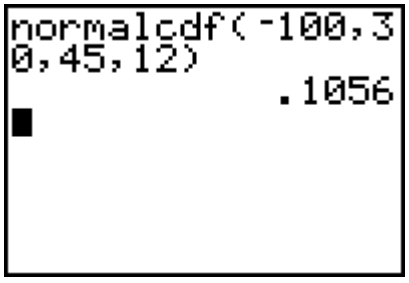


Enter *a* (lower bound), *b* (upper bound), μ (mean), and σ (standard deviation) separated by commas and then hit ENTER and the TI-83 will give you the correct probability. Note: you may have to enter an arbitrarily small or large lower bound or upper bound if you are computing areas that are not between two values.

Example: The ages of workers at a manufacturing plant are normally distributed, with mean 45 years and standard deviation 12 years. A worker is stopped at random and asked to fill out a questionnaire.
(a) What is the probability that the worker is less than 30 years old?
(b) What is the probability that the worker is between 35 and 55 years old?
(c) What is the probability that the worker is more than 63 years old?

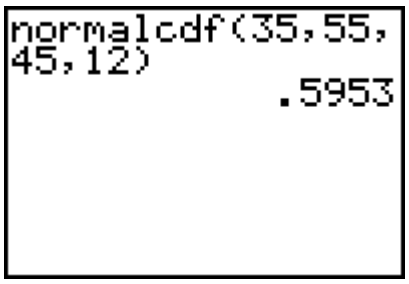
For this problem μ = 45, σ = 12 and X = the age of workers at the plant.

(a) We want P(X < 30) = .1056



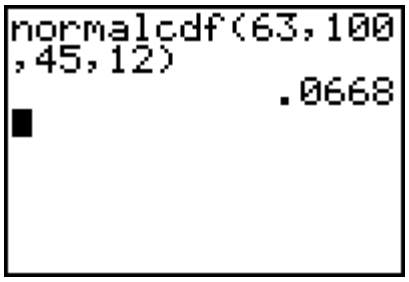
Notice for this example, that I made the lower bound (*a*) an arbitrarily small value (–100).

(b) We want P(35 < X < 55) = .5953



Note: this value will be slightly different than the result you would get using the standard normal table, because the calculator uses the actual z-scores ($\pm$ .8333…) instead of a rounded value ($\pm$ .83).

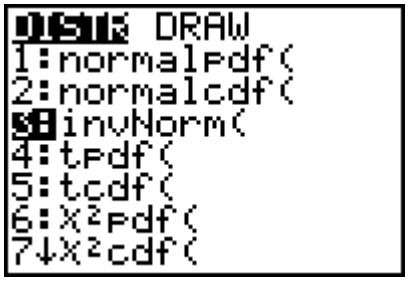
(c) We want P(X > 63) = .0668



Again, notice for this example that I made the upper bound (*b*) an arbitrarily large value (100).

The TI-83 will also calculate a specific x-value or raw score associated with a given cumulative area (probability) under the normal curve (the "backwards" normal problem).

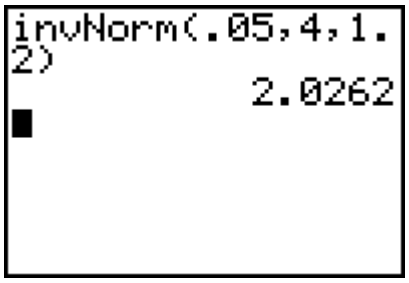
Hit 2ND and DISTR (above the VARS button) buttons. Arrow down and select 3: invNorm(which stands for inverse normal distribution.



Enter the cumulative area (probability), μ (mean), and σ (standard deviation) separated by commas and then hit ENTER and the TI-83 will give you the correct x-value or raw score.

Example: The life of a GE electric fan is normally distributed with mean 4 years and standard deviation 1.2 years. The manufacturer will replace any fan free of charge while it is under guarantee. For how many years should a GE fan be guaranteed if the manufacturer does not want to replace more than 5% of them? (Give the answer to the nearest month).

For this problem μ = 4, σ = 1.2 and the cumulative area or probability is 5% (does not want to replace more than 5% of the fans).



Therefore we would guarantee the fan for 2.0262 years or 24 months.

Note: You can also use the TI-83 to calculate probabilities that the sample mean, $\overline{X}$, will fall in a given interval of the $\overline{X}$ sampling distribution. You need only to calculate the standard error of the mean $\frac{\sigma}{\sqrt{n}}$ (and use this value as your standard deviation) before using the procedures above.