

## Normal Distribution

### TI Calculator Steps: Calculate probability with normal distribution

1. Press **2<sup>nd</sup>** then, **VARs** keys to access the DISTR (distributions) menu.
2. Select **normalcdf** and click **ENTER**.
3. Enter the **Lower bound**, **upper bound**, **mean** , and **standard deviation** .  
If you have TI 83, then you will have **normalcdf(lower bound, upper bound, mean, standard deviation)**.  
Note: Use -1E99 for negative infinity, and use E99 for positive infinity.

### TI Calculator Steps: Find X value from the given probability (percent).

1. Press **2<sup>nd</sup>** then, **VARs** keys to access the DISTR (distributions) menu.
2. Select **invNorm** and click **ENTER**.
3. Enter the **area on the left** , **mean**, **standard deviation** .

Example: The IQ scores for college students are normally distributed with mean of 105 and a standard deviation of 13.

- a. A student is randomly selected, find the probability that the student has IQ score less than 112.  
X: IQ score  
 $P(X < 112) = \text{normalcdf}(-E99, 112, 105, 13) = 0.7049$
- b. A student is randomly selected, find the probability that the student has IQ score between 95 and 110.  
X: IQ score  
 $P(95 < X < 110) = \text{normalcdf}(95, 110, 105, 13) = 0.4289$
- c. Find the 25<sup>th</sup> percentile ( $P_{25}$ )  
 $X = \text{invNorm}(0.25, 105, 13) = 96.23$

### **Practice Problems**

1. The scores on a test are normally distributed with a mean of 65 and a standard deviation of 12.
  - a. What is the probability that a randomly selected student has a test score more than 70?
  - b. What is the probability that a randomly selected student has a test score less than 50?
  - c. The instructor requires mandatory tutoring for students with the lowest 10% of test score, what is the cutoff score?

2. The time (in minutes) that students spent on social media sites per day are normally distributed with a mean of 85 minutes and a standard deviation of 21 minutes.
  - a. If one student is randomly selected, find the probability that the student spent less than 60 minutes on social media sites per day.
  - b. Find the 95<sup>th</sup> percentile of time spent on social media sites per day.
  - c. If 16 students are randomly selected, find the probability that their mean time spent on social media sites is less than 60 minutes. (note that the standard deviation changed by central limit theorem).