3.4 – Inverse Normal Distributions

Every z-score has a unique cumulative normal probability associated with it – which means we are able to do this process in reverse. We can take a given probability and find a z-score that is associated through the function: invNorm(p). This is also found in the distributions menu: press [2] [VARS]. This function takes one input, which is the total cumulative area to the left of the z-score we want to find. If our problem gives us area to the right, we have to make an adjustment first.

(Ex) Find the z-score associated with the shaded region:

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You can also use the normal distribution in reverse with values relative to any mean or standard deviation, but you first need to solve the z-score formula for x:

$$= \mu + \ \sigma$$

Then after you get your z-score values from invNorm, you can put them into this formula to convert them.

Calculator Usage:

Alternatively, you can also provide additional inputs to invNorm and the calculator will convert these numbers for you, using the above formula.

1. **1-input: invNorm (p)**
2. **3-input: invNorm (p, mean, standard deviation)**

In either case, the value of p is assumed to be the area under the curve to the left of the value you are

1. IQ scores are normally distributed with mean of 100 IQ points and a standard deviation of 15 IQ points. What score bounds the top 10% of IQ scores?

2. Women's heights are normally distributed with a mean of 63.8 inches and a standard deviation of 2.9 inches. If the shortest 1% of women are ineligible to serve in the military, what is the cut-off height a woman must be in order to be eligible for military service?