Using StatCrunch: Normal Distribution

Video: [http://www.youtube.com/watch?v=8ms0v9qQuHk](http://www.youtube.com/watch?v=8ms0v9qQuHk)

Example 1:
Find the following probabilities from the Standard Normal Distribution:

1. \( P(z \leq 1.5) \)
2. \( P(z \geq -1) \)
3. \( P(-1 \leq z \leq 1) \)

Note: we use \( z \) when discussing a standard normal distribution (z-score)

(1) Click **Stat–Calculators–Normal**

(2) The calculator will initially be set to the standard normal distribution (\( \mu=0, \sigma=1 \))

(1) To find \( P(z \leq 1.5) \) select “\( \leq \)” (in the left box), enter “1.5” (in the middle box), then **Compute**.

   The answer will appear in the right box (0.9331...)

Notice that the shaded area changes so it goes to the left and stops at 1.5. You can use this visual to make sure you are making the correct computation (i.e. if it goes to the left or the right).
(2) To find $P(z \geq -1)$ select “=>” (in the left box), enter “1.5” (in the middle box), then **Compute**. The answer will appear in the right box (0.0227...)

(3) To find $P(-1 \leq z \leq 2)$ we use the following equation:

$$P(a \leq z \leq b) = P(z \leq b) - P(z \leq a)$$

Using StatCrunch: $P(z \leq 1.2) = 0.8849303$ and $P(z \leq -1.6) = 0.054799292$ 

So $P(-1 \leq z \leq 2) = 0.8849303 - 0.054799292 = 0.830131008$

Thus, the answer is about 0.8301 (don’t round off until the end, or it could incorrect)

**Note:** If you draw a quick sketch of what the area under the curve should look like, you can use the images to make sure you’re using the right numbers.
Example 2:
The Intelligence Quotient (IQ) test results are normally distributed with a mean of 100 points and standard deviation of 15 points.

1. Find the percentage of people whose IQ score is above 120
2. Find the percentage of people whose IQ score is between 90 and 110

First, open the Normal Calculator, enter “100” in the Mean box, “15” in Std.Dev. box, then hit Compute.

(1) The percentage of scores above 180 corresponds to \( P(x \geq 180) \)
Select “=>” (in the left box), enter “180” (in the middle box), then Compute. The result will appear in the right box (0.0912...)
Thus, about 9.1% of people have IQ scores higher than 120.

(2) The percentage of scores between 90 and 110 corresponds to \( P(90 \leq x \leq 110) \)
Again, we can use the following formula:

\[
P(a \leq x \leq b) = P(x \leq b) - P(x \leq a)
\]
Using the calculator: \( P(x \leq 110) = 0.74750745 \) and \( P(x \leq 90) = 0.25249255 \)
Plugging in, we get \( P(90 \leq x \leq 110) = 0.74750745 - 0.25249255 = 0.4950149 \)
Thus, about 49.5% of the scores are between 90 and 110.