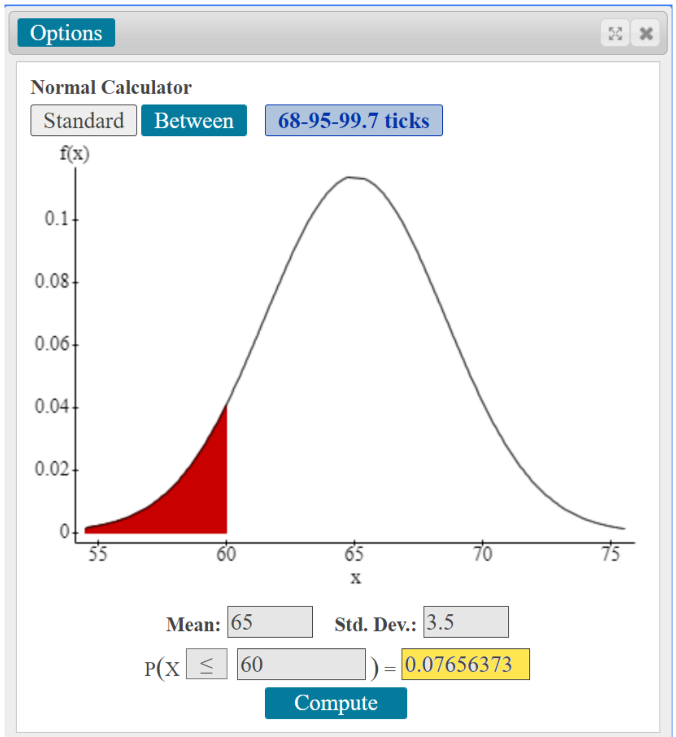
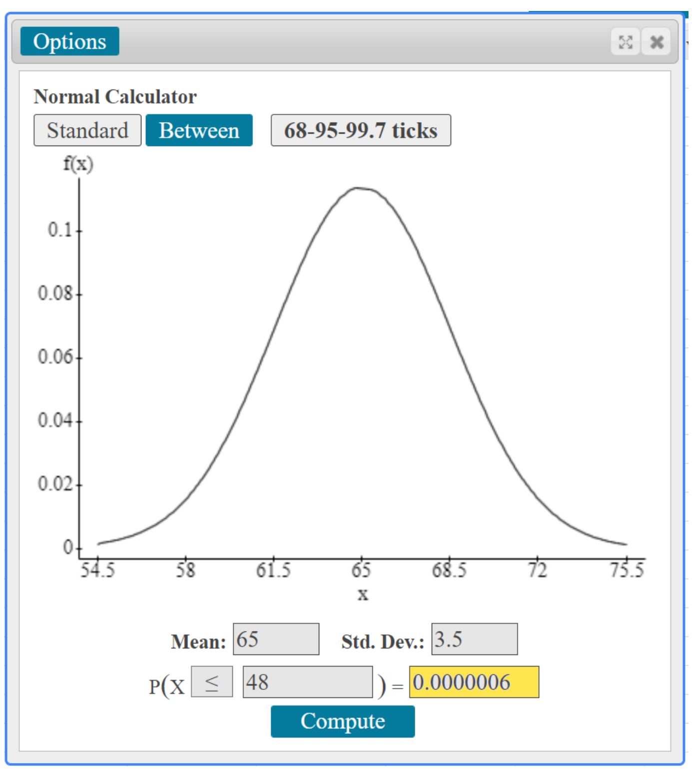
MA 207 Continuous Probability Models **Name:** ________________ **Date:**_____

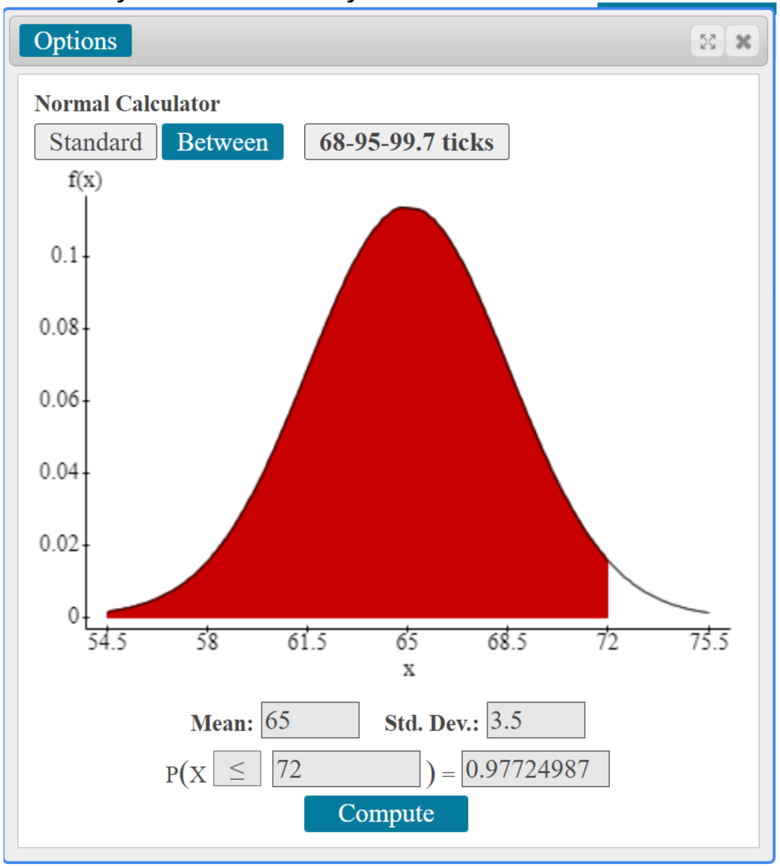
1. The heights of adult women are normally distributed with a mean of 65" and a standard deviation of 3.5". Use StatCrunch to answer the following questions.
   a. Find the probability that a randomly selected woman is shorter than 5 feet tall.



   b. Find the probability that a randomly selected woman is shorter than 4 feet tall.

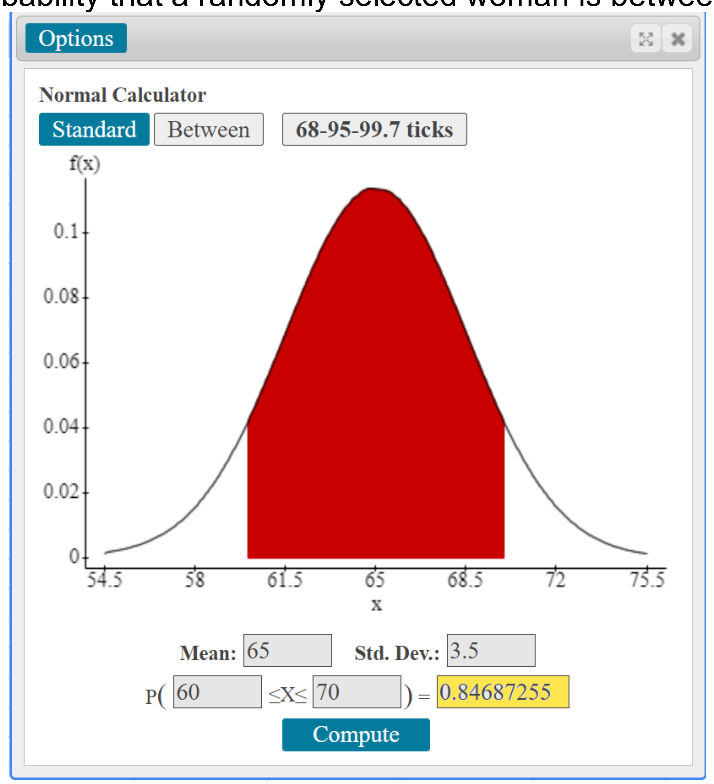


c. Find the probability that a randomly selected woman is taller than 6 feet tall.

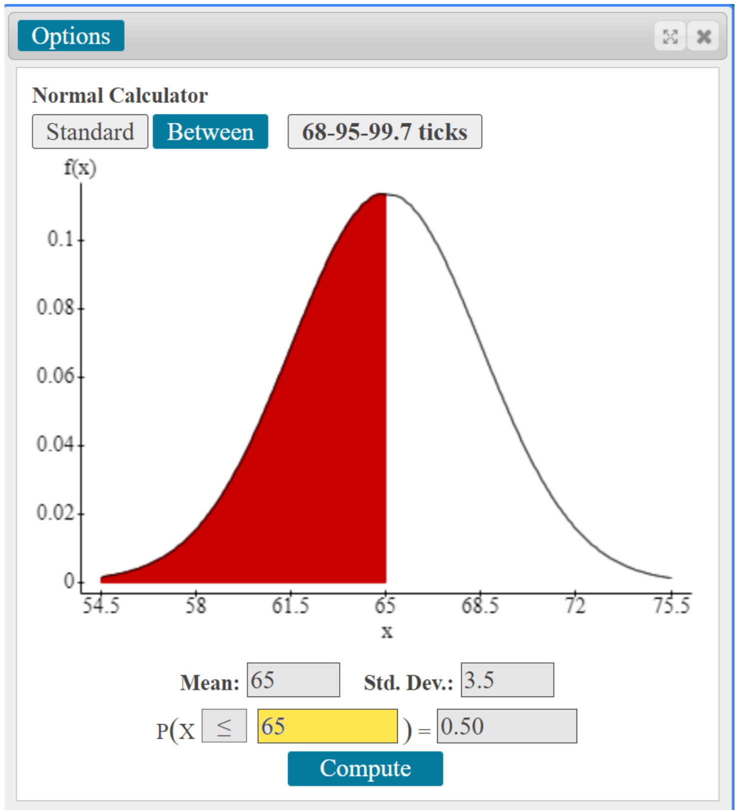


"Taller than 6 feet" is a right-hand area, so we subtract the above left-hand area from 1: $P(> 72") \approx 1 - 0.977 = 0.023$

d. Find the probability that a randomly selected woman is between 5 feet and 5'10".

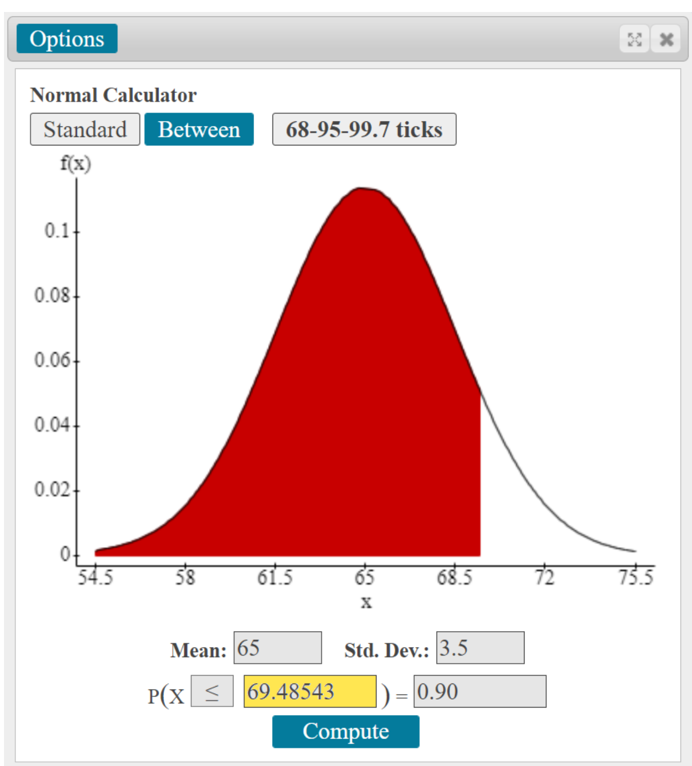


e. Find the height that represents the 50^{th} percentile for women.

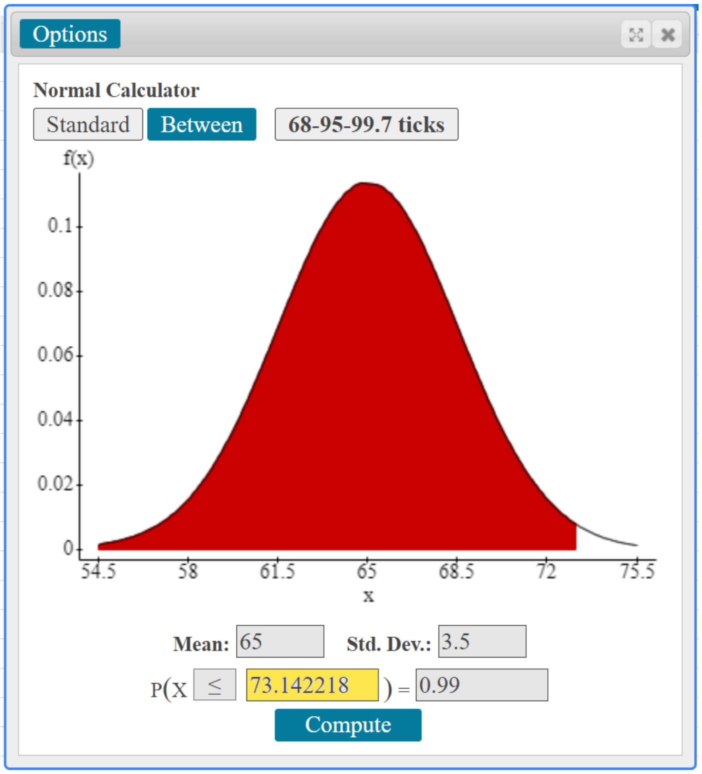


Here we have to enter the 0.50 for the required probability, and StatCrunch tells us that a height of 65" would give us that area. Note that 65" is the mean, which is what we expect for the 50^{th} percentile in a symmetric distribution.

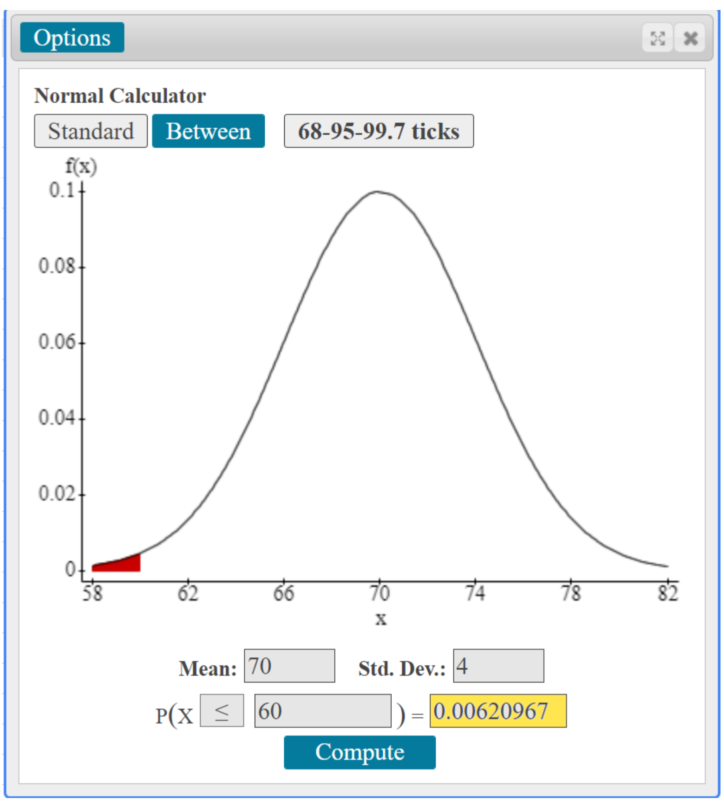
f. Find the height that represents the 90^{th} percentile for women.



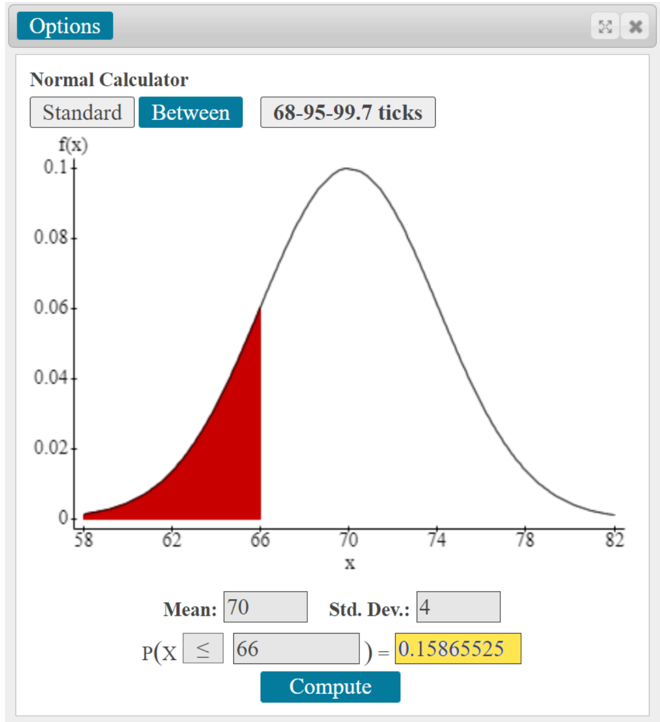
g. Find the height that represents the 99th percentile for women.



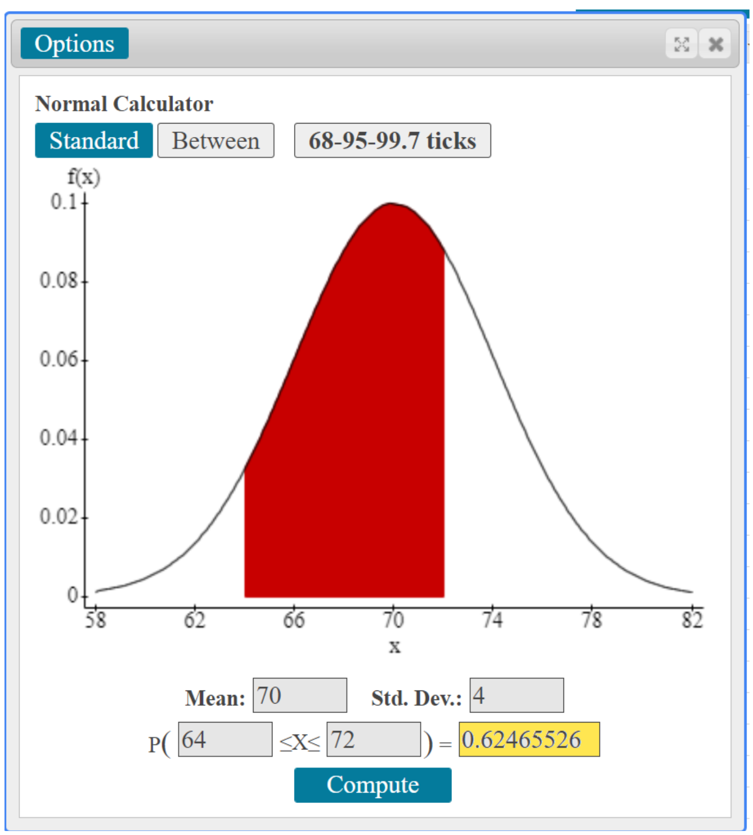
2. The heights of adult men are normally distributed with a mean of 70" and a standard deviation of 4". Use StatCrunch to answer the following questions.
   a. Find the probability that a randomly selected man is shorter than 5 feet tall.



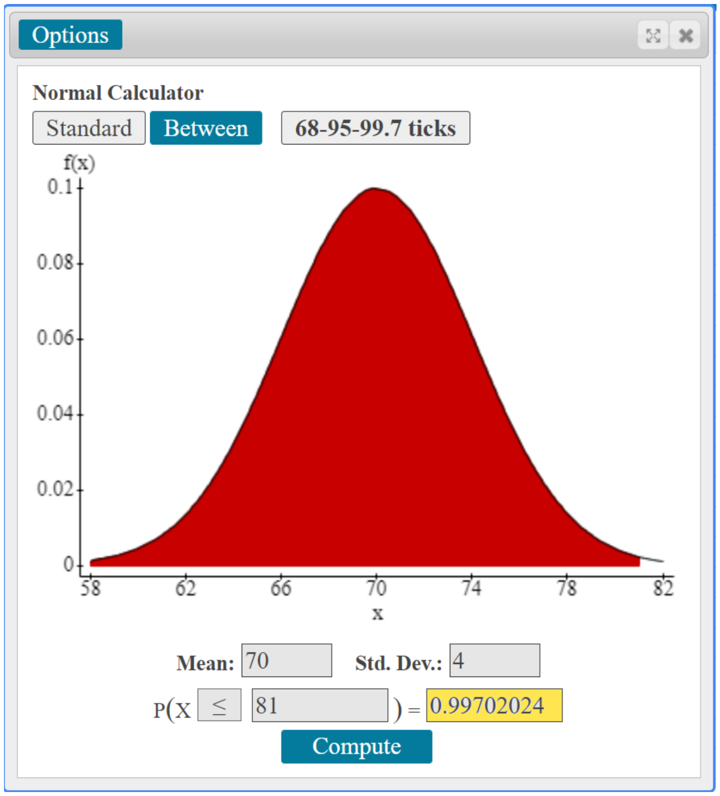
b. Find the probability that a randomly selected man is shorter than 5'6" feet tall.



c. Find the probability that a randomly selected man is between 5'4" and 6 feet tall.

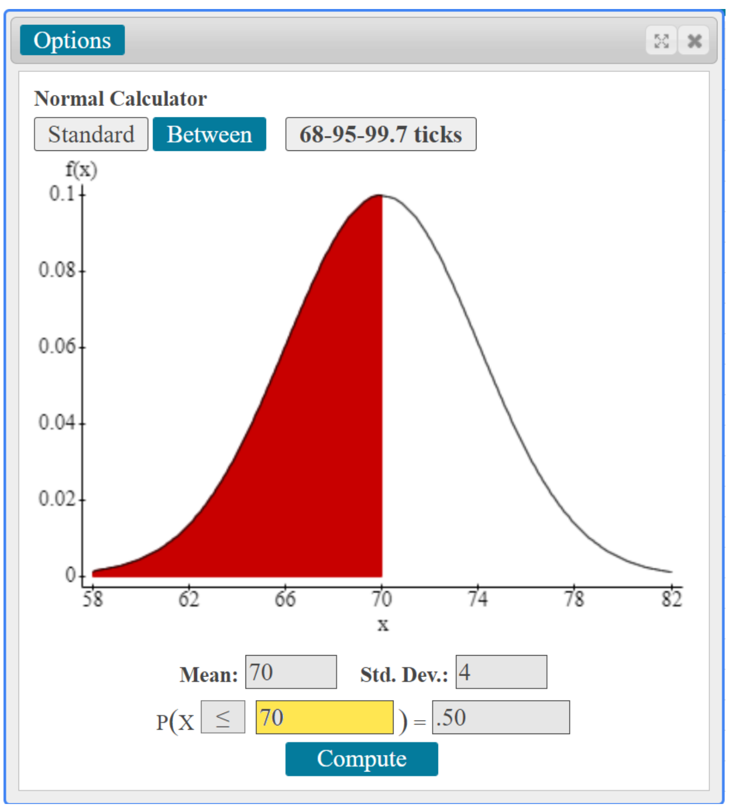


d. Find the probability that a randomly selected man is taller than LeBron James.

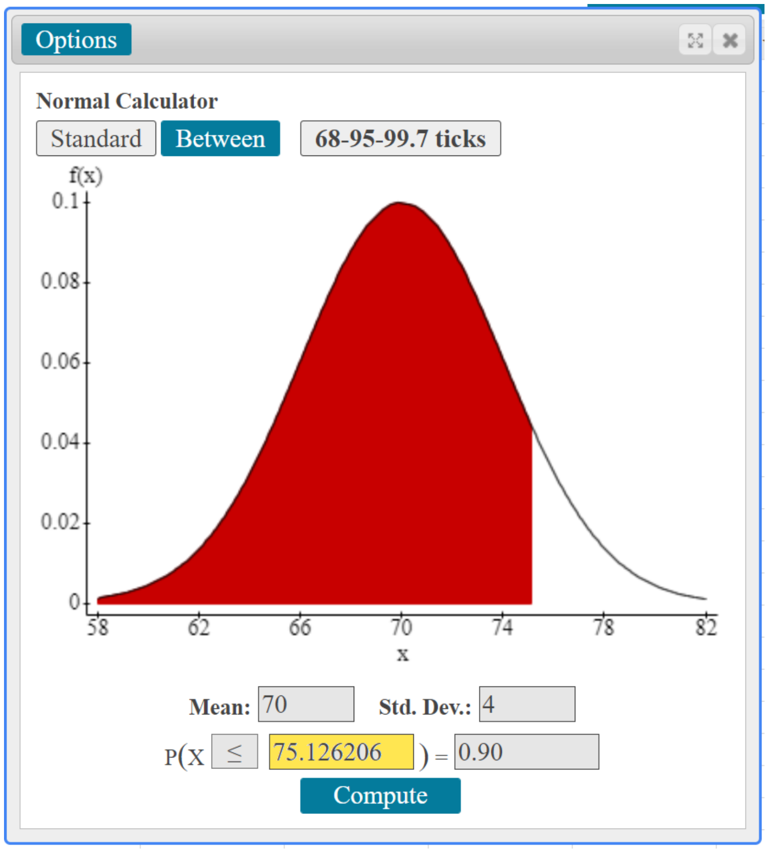


$P(> 81") \approx 1 - 0.997 = 0.003.$

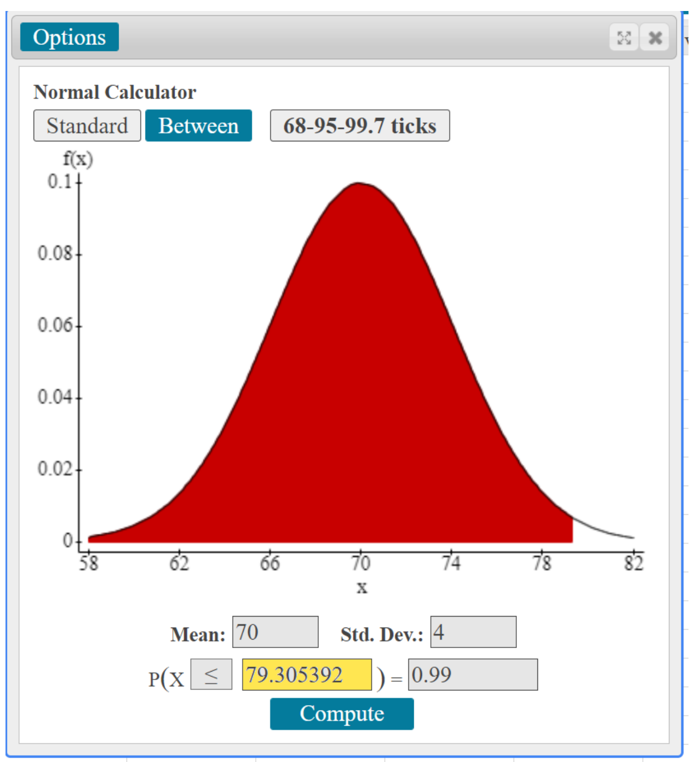
e. Find the height that represents the 50th percentile for men.



f. Find the height that represents the 90th percentile for men.



g. Find the height that represents the 99th percentile for men.



3. Assuming IQ's are normally distributed with mean 100 and standard deviation 15, answer the following question. Which is rarer, a person with an IQ higher than 140 or a woman that is taller than 6'1"?

We can compare z-scores because the larger the z-score, the rarer the observation. We could also use StatCrunch to find the percentiles for each score and pick the higher one. For the z-scores:

$$z_{IQ} = \frac{140 - 100}{15} = 2.67$$
$$z_H = \frac{73 - 65}{3.5} = 2.29.$$

Since the IQ cutoff has the higher z-score, it would be rarer to find someone whose IQ is above 140 than it would be to find a woman who is taller than 73".