

You must show work requested, showing use of geometry and algebra, formula or calculator command. Follow rounding instructions for each problem.

If a graph is required, it must be labeled to show all important values and shaded to indicate the region representing the probability. Graphs should be reasonably representative of the situation. Label X values below the graph along the x axis. Label areas inside or above the graph.

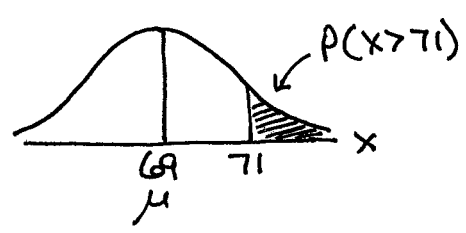
If a question asks for a symbolic mathematical probability statement it is asking to answer in the form of $P(X < 10) = 0.32$ or $P(X > 10) = 0.68$ or $P(6 < X < 8) = 0.37$; it is not asking for a sentence.

1. [8 points] Sources: <https://theblog.okcupid.com/the-big-lies-people-tell-in-online-dating-a9e3990d6ae2>
<https://biology.stackexchange.com/questions/9730/what-is-the-standard-deviation-of-adult-human-heights-for-males-and-females>
<http://abcnews.go.com/Technology/story?id=98438>

The distribution of heights of all American adult males follows a normal probability distribution with a mean of 69 inches. Suppose that the standard deviation is 2.7 inches.

$X =$ height of an adult American man $X \sim N(69, 2.7)$

- a. Find the probability that the height of a randomly selected adult American man is more than 71 inches.
- Show work finding the requested probability. Round your answer to 3 decimal places.
 - Graph Required: Draw and shade the graph and label all important values.
 - State your final answer in the form of a symbolic mathematical probability statement.

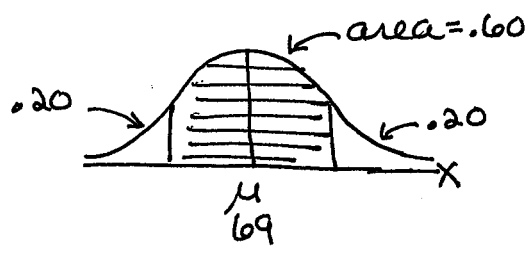


normalcdf(71, 10^99, 69, 2.7)

$P(X > 71) = .229$

- b. The middle 60% of heights are between 66.7 and 71.3 inches.

- Show work finding the requested values. Round your answers to 1 decimal place; tenths of an inch.
- Graph Required: Draw and shade the graph.
 Below the X axis, label all important X values.
 Label the sizes of all areas above or inside the graph.



$\text{invnorm}(.2, 69, 2.7) = 66.7276 \approx \boxed{66.7}$
 $\text{invnorm}(.8, 69, 2.7) = 71.272 \approx \boxed{71.3}$

2. [5 points] TalkFast Phone Company finds that the lengths of cell phone calls follows an exponential distribution with a mean of 1.96 minutes. $\mu = 1.96$
 X = the length of a cell phone call

Write the distribution for X : $X \sim \underline{\text{Exp}(0.51)}$ or $\text{Exp}(1/1.96)$ | $\mu = 1.96$ so $m = \frac{1}{\mu} = \frac{1}{1.96} = .51$

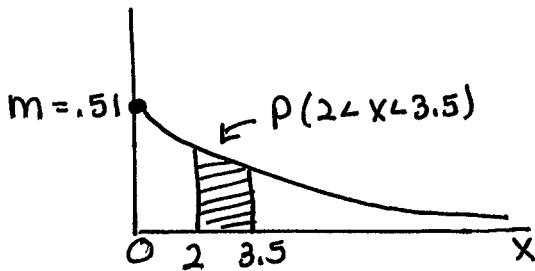
Find the probability that the length of a cell phone call is between 2 and 3.5 minutes.

- Show work finding the requested probability. Round numbers to 3 decimal points in all calculations.
- Graph Required: Draw and shade the graph and label all important values.
- State your final answer in the form of a symbolic mathematical probability statement.

$$P(2 < X < 3.5) = e^{-.51 * 2} - e^{-.51 * 3.5}$$

$$e^{-.51 * 2} - e^{-.51 * 3.5}$$

$$P(2 < X < 3.5) = .193$$



3. [7 points] Rosa is a pre-school teacher. Suppose the total amount of time that Rosa read stories to her pre-school class each day is uniformly distributed between 9 and 25 minutes.

a. Find the probability that Rosa reads to her class for less than 20 minutes.

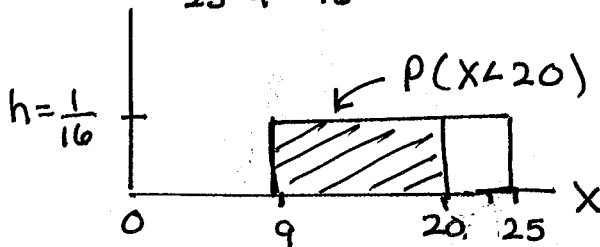
- Show work finding the requested probability. Round your answer to 4 decimal places.
- Graph Required: Draw and shade the graph and label all important values.
- State your final answer in the form of a symbolic mathematical probability statement.

$$h = f(x) = \frac{1}{25-9} = \frac{1}{16} = .0625$$

$$P(X < 20) = (\text{base})(\text{height}) = (20-9) \left(\frac{1}{16}\right)$$

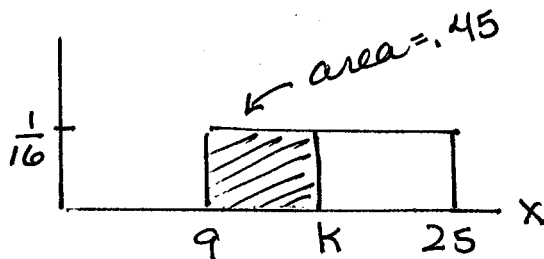
OR
 $(20-9)(.0625)$

$$P(X < 20) = \frac{11}{16} = .6875$$



b. Find 45th percentile for the daily amount of time that Rosa reads to her class.

- Show work finding the requested value(s). Round your answer to 1 decimal place ; tenths of a minute.
- Graph Not Required: But it may be helpful - you can draw one if it helps you solve this problem.



$$\text{area} = (\text{base})(\text{height})$$

$$.45 = (k-9) \left(\frac{1}{16}\right) \text{ OR } .45 = (k-9)(.0625)$$

$$16(.45) = k-9$$

$$7.2 = k-9$$

$$k = 16.2$$

$$\frac{.45}{.0625} = k-9$$

$$7.2 = k-9$$

$$k = 16.2$$