

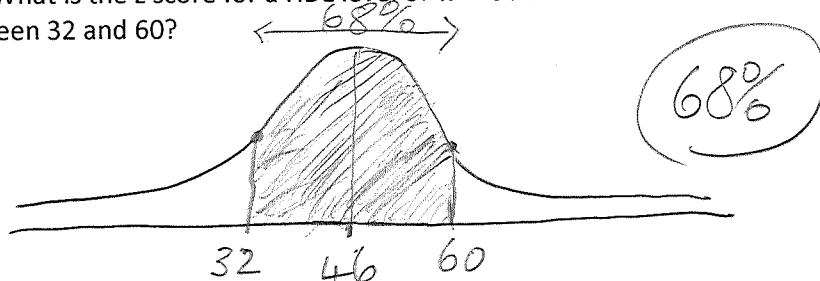
1. According to one study, the distribution of HDL (good) cholesterol levels for men is approximately bell-shaped with a mean of 46 mg/dL and a standard deviation of 14 mg/dL.

For each part below, sketch a separate bell-shaped curve (be sure to put a scale on the horizontal axis) and shade an appropriate region, then give a numerical answer to the question.

- a. What is the z score for a HDL level of  $x = 32$ ? What is the z score for a HDL level of  $x = 60$ ?  
What percent of subjects have HDL levels between 32 and 60?

$$\text{For } x = 32, z = \frac{32 - 46}{14} = -1.$$

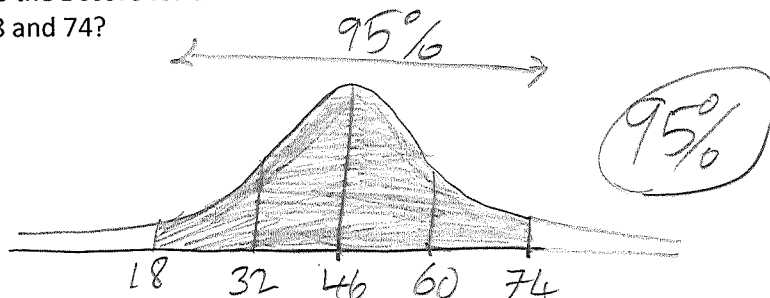
$$\text{For } x = 60, z = \frac{60 - 46}{14} = 1.$$



- b. What is the z score for a HDL level of  $x = 18$ ? What is the z score for a HDL level of  $x = 74$ ?  
What percent of subjects have HDL levels between 18 and 74?

$$\text{For } x = 18, z = \frac{18 - 46}{14} = -2.$$

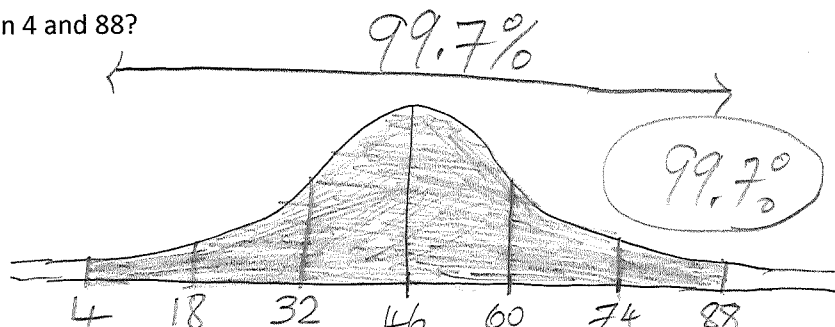
$$\text{For } x = 74, z = \frac{74 - 46}{14} = 2.$$



- c. What is the z score for a HDL level of  $x = 4$ ? What is the z score for a HDL level of  $x = 88$ ?  
What percent of subjects have HDL levels between 4 and 88?

$$\text{For } x = 4, z = \frac{4 - 46}{14} = -3.$$

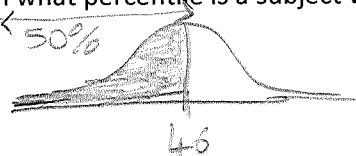
$$\text{For } x = 88, z = \frac{88 - 46}{14} = 3.$$



For each part below, making a sketch is optional, but you should know how to do it. What percent of subjects have HDL levels that are...

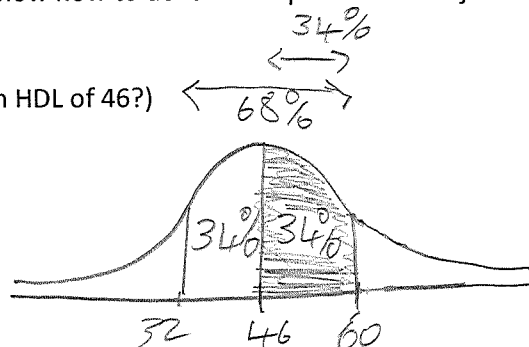
- d. below 46? (Equivalently, in what percentile is a subject with an HDL of 46?)

50%



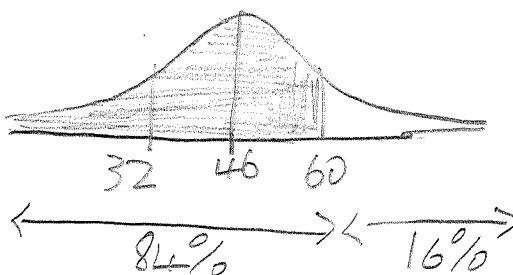
- e. between 46 and 60?

$$\frac{1}{2}(68\%) = 34\%$$



- f. below 60? (Equivalently, in what percentile is a subject with an HDL of 60?)

$$50\% + 34\% = 84\%$$



- g. above 60?

$$100\% - 84\% = 16\%$$

For many problems, there is more than one way to get the one correct answer.

h. below 32 or above 60?

$$100\% - 68\% = 32\%$$

i. below 32? (Equivalently, in what percentile is a subject with an HDL of 32?)

$$\frac{1}{2}(32\%) = 16\%$$

j. above 32?

$$100\% - 16\% = 84\%$$

k. equal to 32?

$$0\% \quad (\text{The area under the curve with width 0 is 0.})$$

l. between 18 and 46?

$$\frac{1}{2}(95\%) = 47.5\%$$

m. above 46?

$$50\%$$

n. above 18?

$$47.5\% + 50\% = 97.5\%$$

o. below 18 or above 74?

$$100\% - 95\% = 5\%$$

p. above 74?

$$\frac{1}{2}(5\%) = 2.5\%$$

q. below 4 or above 88?

$$100\% - 99.7\% = 0.3\%$$

r. below 4?

$$\frac{1}{2}(0.3\%) = 0.15\%$$

s. below 74?

$$100\% - \frac{1}{2}(5\%) = 97.5\%$$

t. between 4 and 74?

$$97.5\% - 0.15\% = 97.35\%$$

u. between 32 and 74?

$$97.5\% - 16\% = 81.5\%$$

v. What is the  $z$  score for a man with an HDL level of  $x = 67$ ?

$$\text{For } x = 67, \quad z = \frac{67 - 46}{14} = 1.5$$

w. What is the HDL level  $x$  of a man with a  $z$  score of  $z = -1.5$ ?

$$\hookrightarrow -1.5 = \frac{x - 46}{14}$$

x. In what percentile is a man with HDL level of  $x = 18$ ?

2.5% below so 3<sup>rd</sup> percentile

y. What is the HDL level  $x$  of a man in the 84<sup>th</sup> percentile?

$$x = 60 \text{ mg/dL}$$

$$-21 = x - 46$$

$$46 - 21 = x$$

$$x = 25 \text{ mg/dL}$$

Again, there is more than one way to approach most of these. No need to show work.