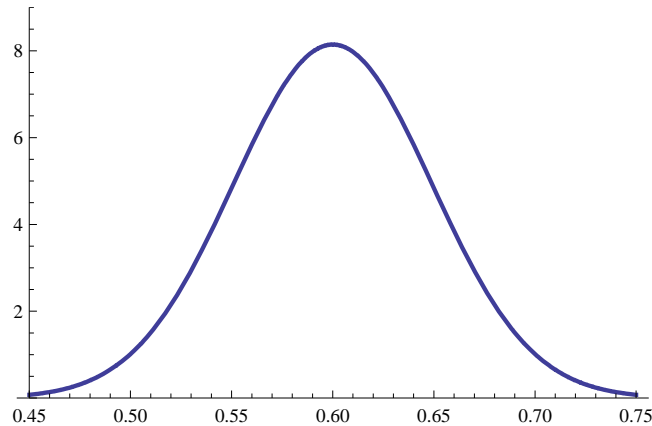


Homework Solutions

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Exercise 12

- (a) The mean is 0.60 and the standard deviation is $\sqrt{\frac{(0.60)(0.40)}{100}} = 0.04899$. The distribution is shown below.



- (b) (i) Use the mean plus or minus one standard deviation. The standard deviation rounded off is 0.05. So that would be $0.60 - 0.05 = 0.55$ and $0.60 + 0.05 = 0.65$. Then the statement says that there is a 68% chance that the sample proportion is between 0.55 and 0.65.
- (ii) Use the mean plus or minus two standard deviations. That would be $0.60 - 0.10 = 0.50$ and $0.60 + 0.10 = 0.70$. Then the statement says that there is a 68% chance that the sample proportion is between 0.50 and 0.70.
- (iii) Use the mean plus or minus three standard deviations. That would be $0.60 - 0.15 = 0.45$ and $0.60 + 0.15 = 0.75$. Then the statement says that there is a 68% chance that the sample proportion is between 0.45 and 0.75.
- (c) Find the probability of 0.50 or smaller. That is

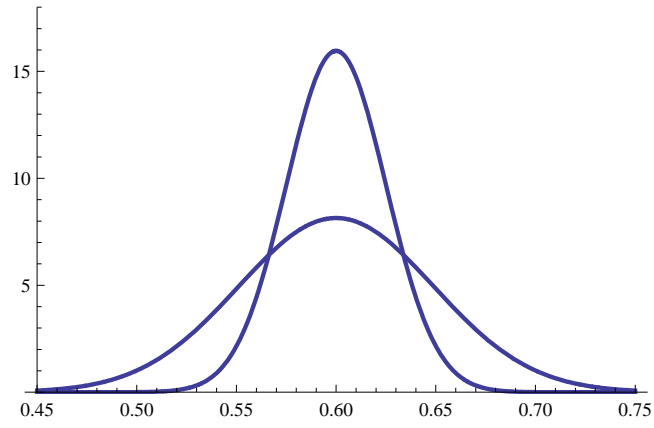
$$\text{normalcdf}(-E99, .50, .60, .05) = 0.0228.$$

Possible, but not likely.

- (d) If the sample size were 400, then the mean would still be 0.60, but the standard deviation would be

$$\sqrt{\frac{(0.60)(0.40)}{400}} = 0.0250.$$

Here is the picture of this distribution, superimposed on the picture from part (a). This one is the taller, skinnier one.



- (i) It is taller and skinnier. In fact, it is twice as tall and half as wide. That is because the standard deviation is half as large.
- (ii) Each interval will be only half as wide.