

## Answer on Question #62744 – Math – Statistics and Probability

### Question

Suppose that 63.6% of brides are younger than their grooms. Suppose one were to consider simple random samples of size 36 of brides.

What is the probability that the proportion of brides in a sample of size 36 who are younger than their grooms exceeds 0.646?

### Solution

Given both  $np = 36 \cdot 0.636 = 22.896 > 10$ ,

$n(1 - p) = 36(1 - 0.636) = 13.104 > 10$ , the distribution of sample proportion will be approximately normally distributed with a mean  $p = 0.636$  and standard

deviation of  $SE = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.636(1-0.636)}{36}}$ .

The probability that the proportion of brides in a sample of size 36 who are younger than their grooms exceeds 0.646 will be

$$\begin{aligned} P(\hat{p} > 0.646) &= P\left(\frac{\hat{p} - p}{SE} > \frac{0.646 - 0.636}{\sqrt{\frac{0.636(1 - 0.636)}{36}}}\right) \approx \\ &\approx P\left(Z > \frac{0.646 - 0.636}{\sqrt{\frac{0.636(1 - 0.636)}{36}}}\right) = 1 - P\left(\frac{0.646 - 0.636}{\sqrt{\frac{0.636(1 - 0.636)}{36}}}\right) = \end{aligned}$$

$$= 1 - 0.54962 = 0.45038,$$

where  $Z$  is normally distributed with a mean 0 and standard deviation of 1.

**Answer:** 0.45038.