

#2 a) The hypothesis testing is:

$$H_0: p = 0.6 \quad \text{vs} \quad H_a: p > 0.6$$

$$\begin{aligned} \text{b) LOS: Level of Significance} &= \Pr\{X \geq 17 \mid H_0: p = 0.6\} \\ &= 1 - \Pr\{X \leq 16\} \\ &= 1 - 0.984 \\ &= 0.016 \end{aligned}$$

$$\begin{aligned} \text{LOS: Level of Significance} &= \Pr\{X \geq 16 \mid H_0: p = 0.6\} \\ &= 1 - \Pr\{X \leq 15\} \\ &= 1 - 0.949 \\ &= 0.051 \end{aligned}$$

c) The power of a statistical test is $1 - \beta$.

$$1 - \beta = \Pr\{\text{reject } H_0 \text{ when } H_a \text{ is true}\}$$

$$\begin{aligned} 1 - \beta &= \Pr\{X \geq 17 \mid p = 0.8\} \\ &= 1 - \Pr\{X \leq 16\} \\ &= 1 - 0.589 = 0.411 \end{aligned}$$

$$\begin{aligned} 1 - \beta &= \Pr\{X \geq 16 \mid p = 0.8\} \\ &= 1 - \Pr\{X \leq 15\} \\ &= 1 - 0.370 = 0.630 \end{aligned}$$

d) The second power value (when $X \geq 16$) is larger than the first one.

If α is increased, the β decreases, and vice versa.

The only way to decrease β for a fixed α is to "buy" more information that is, increase the sample size n .