Lesson #50 · Topic 3D · Practice

Answer Key

1. a. $\alpha = 0.01$, because the probability of making a Type I error $= \alpha$ and 0.01 < 0.05.
   b. $\alpha = 0.05$, because increasing α increases the rejection region, which increases the probability of correctly rejecting H_0 when it is false, therefore increasing the power of the test.
   c. $\alpha = 0.05$, because P (Type II error) + power = 1. Since $\alpha = 0.05$ gives higher power (from part (b)), it must also give a lower probability of Type II error.

2. a. If the efficacy rate for the new vaccine is actually 60%, there is a 0.88 probability the hypothesis test will find convincing evidence that the efficacy rate of the new vaccine is greater than 50%.
   b. 1 − 0.88 = 0.12

3. a. $H_0 : p = 0.6$. The pass rate is 60% (stays the same) using the new EFFL teaching method.
   $H_a : p > 0.6$. The pass rate increases using the new EFFL teaching method.
   b. If the actual pass rate when using EFFL equals 60%, there is a 0.05 probability of incorrectly rejecting the null and concluding the pass rate increased.
   c. If the actual pass rate when using EFFL is 72%, there is a 0.19 probability of incorrectly failing to reject the null and not finding convincing evidence that the pass rate increased.
   d. Power = 1 − 0.19 = 0.81. When the actual pass rate when using EFFL is 72%, there is a 0.81 probability of correctly rejecting the null and concluding that the pass rate increased.

4. a. Decrease α. The probability of making a Type I error $= \alpha$, so P (Type I) decreases when α decreases.
   b. Answers may vary. Any of the following are acceptable ways to increase power: increase the sample size, increase α, or further decrease the actual proportion of travelers who wait more than 5 minutes for the bus during peak hours.

5. B

6. A