WISE Power Tutorial – Follow-up Questions

1. Your good friend Bumble found a sample mean of 558 with a sample of 10000 graduates from Program D. He correctly computed $p < .05$ and rejected the null hypothesis that the population mean for Program D is 555. Bumble concluded that he had strong evidence that the Program D does a very good job of preparing individuals for the standardized test. Evaluate Bumble's conclusion, and interpret his findings. (Hint: Are you confident that the course produces a substantial increase in test performance? Why or why not?)

2. Many statisticians argue that hypothesis-testing procedures do not provide much useful information. Rejecting the null hypothesis tells us only that it is unlikely that the sample came from a population with a specific mean. However, procedures like the z-test do not give much information about the "true" value of the mean from which we are sampling. Means may be statistically different, but there is no indication of whether the size of the difference is large enough to be considered important in real world terms.

How does this relate to results in Question 1 above? (Be sure to discuss power, effect size, and statistical significance vs. practical significance.)

3. When we reject the null hypothesis, have we always found an important effect? What other considerations may be important?

4. For several of the sampling exercises we used a one-tailed test with alpha of .05 ($z = 1.645$). If we used a two-tailed test with the same alpha value ($z = 1.96$), would you have been able to reject your null hypotheses more or less often? Explain.

5. The Power applet represents a one-tailed hypothesis testing approach. The applet shows the null and alternative distributions and the rejection region the area that corresponds to alpha). Using the applet as a model, draw a graph that represents the rejection regions for a two-tailed test. Clearly label the area(s) corresponding to rejection of the null hypothesis and the area in which one would fail to reject the null hypothesis.