Economics 250 Mid-Term Test 2
21 March 2014

Instructions: You may use an approved hand calculator. Do not hand in the question sheet. Answer all four questions in the answer booklet provided. Show your work. Formulas and tables are provided at the end of the question pages.

1. Suppose that you believe there is a 55% chance of a political party winning any individual seat in an election.

(a) If 6 seats are contested, what is the chance that the party wins at least half? What is the chance the party wins all the seats?

(b) If 50 seats are contested, what is the chance that the party wins at least half?

2. Suppose that house prices in Vancouver are normally distributed with mean μ and standard deviation 20. Suppose that you collect a sample of 36 prices with an average value of 400.

(a) Find a 90% confidence interval for the population mean.

(b) Suppose that you would like the margin of error to be no larger than 4. How large must the sample size be?

(c) If you cannot increase the sample size to the value you found in part (b), what would the confidence level be to give a margin of error equal to 4 with the original sample size?

3. An economist is studying the properties of an asset price x. Suppose the economist knows that $x \sim N(\mu, 3)$, so that the standard deviation is 3. She studies a random sample of 16 observations and finds an average price 2. She wishes to test the null hypothesis that $\mu = 0$ against the alternative hypothesis that $\mu > 0$.

(a) Suppose that the significance level is pre-set at $\alpha = 2.5\%$. Find the critical value for the test, labelled $\overline{x}_c$. Does the economist reject the null at this level of significance?

(b) Unbeknownst to the economist, the true value of μ is 1. Find the probability of type II error and the power of the test that was adopted in part (a).

4. Researchers study a sample of 16 firms. Exports by these firms have an average value of 10 before a currency depreciation occurs. These exports have an average value of 12 after a depreciation occurs. When the researchers track the change in exports for each firm, they find that that change has a standard deviation of 2.

(a) Find a 90% confidence interval for the mean change in exports.

(b) Test the null hypothesis that the mean change in exports is 3.301 against the alternative that it is not equal to 3.301, by reporting the P-value.