Economics 250 Mid-Term Test 2
22 March 2012

Instructions: You may use a 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 a political party that you support has a 40% chance of winning any seat in an election.

(a) If 10 seats are being contested, what is the probability that your party wins 4 or more seats? What is the probability that they win 5 or more seats?

(b) If 100 seats are being contested, what is the probability that your party wins 40 or more seats? What is the probability that they win 50 or more seats?

2. Suppose that a blood test for athletes gives a numerical reading x and that $x > 4$ is considered a positive test for a banned drug.

(a) For those not taking the drug, x is continuously and uniformly distributed between 0 and 5. What is the probability of a positive test for them?

(b) For those who are taking the drug, x is continuously and uniformly distributed between 3 and 9. What is the probability of a positive test for them?

(c) Suppose that you believe 10% of athletes are taking the drug. If you test an athlete and find $x > 4$ what is the probability she or he is actually taking the drug?

3. A stress test of 100 European banks shows that half of them (*i.e.* a proportion 0.5) have enough capital.

(a) Find a 95% confidence interval for the population proportion.

(b) Test the null hypothesis that the population proportion is $P = 0.6$ against the alternative hypothesis that $P < 0.6$, with $\alpha = 0.10$. What is the prob-value (also known as the p-value) for your test statistic?

4. A researcher is studying historical data on human heights. She finds a sample of 20 people with an average height of 154 cm and a sample standard deviation of 8 cm. Assume the population distribution is normal.

(a) Find a 90% confidence interval for the population's average height.

(b) Perform a two-sided test (at the 10% level of significance) of the null hypothesis that the average height in the population is 158 cm.