Economics 250 Mid-Term Test 1
16 February 2010

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. A development economist studies the relationship between life expectancy in years (x) and income per capita in thousands of dollars (y) for three countries and finds the following (x, y) pairs: (45,15); (78,40); (60,23).

(a) Find the sample means $\overline{x}$ and $\overline{y}$.

(b) What is the sample correlation coefficient between life expectancy and income?

2. Suppose that we know three facts about unemployed workers. First, 30% do not find a job within the next few months while the remainder do find a job. Second, 15% receive training while unemployed. Third, 5% both receive training *and* find a job.

(a) What is the probability of finding a job given that one receives training?

(b) Suppose you observe a worker who has just found a job and exited unemployment. What is the probability that she or he received training while unemployed?

3. Suppose that a bond can pay an amount \$100 with probability 0.75 and a lesser amount \$40 with probability 0.25.

(a) What is the expected value of the amount paid?

(b) An investor is offered a 50% share in this bond for a price of \$40, so the profit is $0.5x - 40$ where x is the payoff described above, that can take on two values. What is the expected value of the profit?

(c) Suppose you were not absolutely sure of the two probabilities and so wanted to track other possible values. You denote the probability of a payment of \$100 by λ and the probability of a payment of \$40 by $1 - \lambda$. Find a *formula* that gives the expected profit on a share in this bond as function of λ.

4. Suppose that the probability that any Toyota has faulty brakes when tested is $P = 0.10$.

(a) If a garage tests $n = 4$ cars what is the probability they find at least 2 with faulty brakes?

(b) If a second garage tests $n = 10$ cars what is the probability they find at least two with faulty brakes?