

Prof. C. M. Dalton
 ECN 209A
 Spring 2014
 Homework 1
Due Thursday, Feb 5th

Question 1 Suppose a random variable Y takes on values 0 and 1 only, and suppose that Y equals 1 with probability $p=0.59$. That is, $\Pr(Y=1) = 0.59$. Compute the mean and variance for this variable Y .

Question 2 The following problem is frequently encountered in the case of a rare disease, say AIDS, when determining the probability of actually having the disease after testing positively for HIV. (This is often known as the accuracy of the test given that you have the disease.) Let us set up the problem as follows: $Y = 0$ if you tested negative using the ELISA test for HIV, $Y = 1$ if you tested positive; $X = 1$ if you have HIV, $X = 0$ if you do not have HIV. Assume that 0.1 percent of the population has HIV and that the accuracy of the test is 0.95 in both cases of (i) testing positive when you have HIV, and (ii) testing negative when you do not have HIV. (The actual ELISA test is actually 99.7 percent accurate when you have HIV, and 98.5 percent accurate when you do not have HIV.)

a. Assuming arbitrarily a population of 10,000,000 people, use the accompanying table to first enter the column totals.

	Test Positive ($Y=1$)	Test Negative ($Y=0$)	Total
HIV ($X=1$)			
No HIV ($X=0$)			
Total			10,000,000

b. Use the conditional probabilities to fill in the joint absolute frequencies.
 c. Fill in the marginal absolute frequencies for testing positive and negative. Determine the conditional probability of having HIV when you have tested positive. Does this result surprise you compared with the paragraph above? Explain.

Question 3 Using the CPS dataset from class, evaluate this statement: During the period 1992-2012, 50 percent of (young adult) workers with Bachelors degrees were women. You may check your work using Stata, but make sure you show your pen and paper calculations to get at your final result. What level of confidence are you using?

Question 4 Using the CPS dataset from class, set up a test for whether the returns to a Bachelors degree have changed over the course of the sample. Use means and do this using the 1. Estimator 2. Hypothesis Test 3. Confidence Interval method described in class. Attach a printout of your Stata results.

Question 5 The following table gives the joint probability distribution between employment status and college graduation among those either employed or unemployed in the working age U.S. population.

	Unemployed ($Y=0$)	Employed ($Y=1$)	Total
Non-college grads ($X=0$)	0.0534	0.6257	0.6791
College grads ($X=1$)	0.0134	0.3075	0.3209
Total	0.0668	0.933	0.9998

- What is the expected value of being employed, $E(Y)$?
- What is the expected value of being employed, given you are a college graduate, $E(Y|X=1)$?
What is the expected value of being employed, given you are not a college graduate, $E(Y|X=0)$?
- What then is the unemployment rate for college grades? For non college grads?