

# First Midterm Exam

Economics 310

Spring 2011

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There are a total of 70 points on the exam corresponding to the amount of time you have to complete the exam. Points for each question are in parenthesis.

You must SHOW YOUR WORK.

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1. (10 points) Consider the following dataset containing the length and the weight of five objects:

Length	20	52	58	60	100
Weight	20	20	23	27	260

- (a) Compute the sample mean and median for the two characteristics.

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- (b) Compute the sample range and variance for the two characteristics. Which has more variability?

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- (c) Compute the sample coefficient of correlation,  $\rho$ , between length and weight and comment on your finding.

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2. (20 points) Suppose  $U \sim Unif(0, 4)$ .

(a) What is  $E(U)$ ?

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(b) What is  $\Pr(U \leq 0.5)$ ?

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(c) Find  $c$  such that  $\Pr(U \geq c) = 0.5$ .

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(d) Let  $W = 1 + 2U$ . What's the distribution of  $W$ ?

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(e) What is  $E(W)$ ?

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3. (10 points) Your roommate is a fan of the Hollywood actor NC. From historical data you know that critics rate a movie by NC as "good" with probability 0.4, "fair" with probability 0.3, and "bad" with probability 0.3. Your roommate may either "buy" or "not buy" a DVD of the latest NC movie. When the movie is rated "good", he always buys the DVD. When the movie is rated "fair", he buys the DVD with probability 0.8. When the movie is rated "bad", he buys the DVD with probability 0.4.

A new NC movie is released but you cannot see the rating. Conditional on observing that your roommate bought the movie, what is the probability that it was rated "good"?

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4. (15 points) Suppose that we have two events,  $C$  and  $D$ , with  $\Pr(C) = 0.4$  and  $\Pr(D) = 0.5$ . Events  $C$  and  $D$  are independent.

(a) What does it mean (i.e. what's the definition) for  $C$  and  $D$  to be independent?

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(b) What is  $\Pr(C|D)$ ?

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(c) Let  $G = C \cup D$ . What is  $\Pr(G)$ ?

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(d) What is  $\Pr(G|C)$ ?

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5. (15 points) There are two risky assets with returns  $R_A$  and  $R_B$ . Suppose that  $E(R_A) = SD(R_A) = .2$ ,  $E(R_B) = SD(R_B) = .4$ , and  $R_A$  and  $R_B$  are independent. Let  $R_p$  denote the return to a portfolio with a fraction  $p$  of funds invested in  $R_A$  and a fraction  $1 - p$  in  $R_B$ .

(a) What's  $Corr(R_A, R_B)$ ?

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(b) Consider the portfolio with  $p = .8$ . What is the expected value of the return for this portfolio? What is the variance of the return for this portfolio?

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(c) Is there a choice of  $p$  (with  $0 < p < 1$ ) such that  $R_p$  dominates  $R_A$ ? Explain.

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(d) Is there a choice of  $p$  (with  $0 < p < 1$ ) such that  $R_p$  dominates  $R_B$ ? Explain.

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