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# Math 210 Exam 2 (Version 2), 2002

Name \_\_\_\_\_

Score:

Problem 1. \_\_\_\_\_

Problem 2. \_\_\_\_\_

Problem 3. \_\_\_\_\_

Problem 4. \_\_\_\_\_

Total: \_\_\_\_\_

**Instruction:** Show all work. No work = no credit, even if you have a correct answer. Notes and calculator are not allowed.

1 (20pts)

(a) Neil has two coins. One is fair and the other is weighted so that the probability of a head is 0.6. A coin is selected at random and flipped twice. The result of each flip is noted. Find the conditional probability that the fair coin was selected, given that there were two heads.

(b) Suppose that an urn contains red balls marked 1,2,3; a blue ball marked 4; and white balls marked 5,6,7,8. A ball is selected at random, and its color and number are noted. Let  $A$ ,  $B$  and  $C$  be the following events:

$A$ : a red ball is drawn.

$B$ : a ball with an even number is drawn.

$C$ : a white ball is drawn.

Decide whether  $A'$  and  $B$  are independent.

3. (15pts)

(a) The following is density function for  $X$  with mean 1. Find a probability  $Pr[X = 1]$ .

$x$	$P(X=x)$
0	$\frac{1}{5}$
1	
2	

(b) Using above density function, calculate the variance of  $X$ .

(c) Three students are selected at random from a class consisting of 3 freshmen, 2 sophomores, and 1 junior. Find the probability that 2 freshmen and 1 junior are selected given that at least 1 junior is selected.

4. (25pts) Just write answers. You don't have to explain. No partial credit for wrong answers.

Ans: (a)                      (b)                      (c)                      (d)                      (e)

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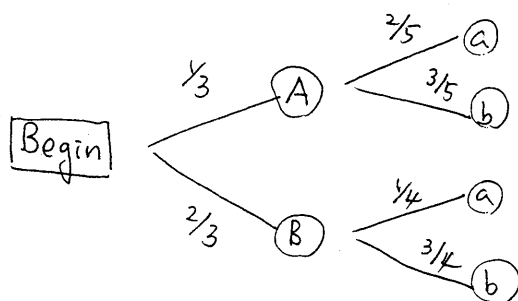
(a) Let  $A$  and  $B$  be two events in the sample space  $S$  such that

$$Pr[A] = 0.45, \quad Pr[B] = 0.65, \quad Pr[A \cup B] = 0.8$$

Find  $Pr[B \cap A']$ ?

(b) Let  $A$  and  $B$  be independent, disjoint events and  $Pr[A] = 0.1$ . Find  $Pr[B]$ ?

(c) Consider the following tree diagram. Compute  $Pr[b|B]$ .



(d) For Bernoulli trials, compute the following probabilities "2 successes in 3 trials with  $p = 0.5$ ".

(e) Suppose that events  $E_1, E_2$  and  $E_3$  form a partition of a sample space  $S$  and we have

$$Pr[E_1] = 2Pr[E_2], \quad Pr[E_3] = 3Pr[E_1].$$

Find the probability of event  $E_3$ .