

Math 1105 – Prelim II

Thursday, October 30, 2008

Name:

Instructor:

INSTRUCTIONS – READ THIS NOW

- This test has **7** problems worth a total of **100** points.
- Please write your name right now.
- **Show your work.** Unless otherwise specified, **no credit will be given for unsupported answers, even if your final answer is correct.** To receive full credit, you must show your reasoning and the steps which led you to your final answer, and these must be neatly written. If you need more space, write on the back side of the preceding sheet, but be sure to label your work clearly.
- If a problem does not ask you to simplify your answer, then you do not have to simplify your answer.
- This is a closed book exam. No electronic device (calculators, cell phones e.t.c.) or any other aid (notes, handouts, book e.t.c.) is allowed.
- The exam is **90 minutes** long. **Good luck!**

Academic integrity is expected of all students of Cornell University at all times, whether in the presence or absence of members of the faculty. Understanding this, I declare I shall not give, use, or receive unauthorized aid in this examination.

Signature of the student:

OFFICIAL USE ONLY:

Problem #	1.	2.	3.	4.	5.	6.	7..	TOTAL
Points earned								

1. (a) (4 points) Are there more license plates made of 3 letters, or made of 3 digits? Justify your answer.

(b) (4 points) How many license plates are there using 3 letters followed by 3 digits? Justify your answer.

(c) (4 points) How many license plates are there using 3 letters followed by 3 digits with no repetition? Justify your answer.

2. (10 points) Three crows, 4 blue jays, and 5 starlings sit in a random order on a section of telephone wire. Find the probability that birds of a feather flock together, that is, that all birds of the same type are sitting together. Justify your answer.

3. (15 points) Consider the experiment where a six-sided die is rolled and a coin is flipped. Consider the following possible events in the sample space of this experiment:

A: Two or less is rolled

B: A tails is flipped

C: A three is rolled or a heads is flipped

Which pairs of these events are dependent? Which pairs of these events are independent? Explain your answer for each of the 3 pairs.

4. (a) (4 points) How many different possible orders are there for the 26 letters in the English alphabet? Justify your answer.

(b) (4 points) If an order is chosen at random, what is the probability that A is one of the first 5 letters? Justify your answer.

(c) (4 points) If an order is chosen at random, and A is one of the first five letters, what is the probability that B is one of the first 10 letters? Justify your answer.

(d) (4 points) Are the events “ A is one of the first five letters” and “ B is one of the first ten letters” independent or dependent events? Explain.

5. (16 points) Three cards are drawn without replacement from a standard deck of 52 playing cards.

Recall that in a standard deck of 52 cards each card has two attributes: a value and a suit. There are four possible suits: hearts, clubs, diamonds and spades. There are thirteen possible values: Ace, 2, . . . , 10, Jack, Queen, King.

- (a) How many different possible sets of three cards are there?
- (b) What is the probability that all three cards have the same suit?
- (c) What is the probability that all three cards are Jacks?
- (d) Given that exactly two of the three cards are Jacks, what is the probability that the other card is a 10?

6. (15 points) There are two bags on a table in front of you, each with four balls. Bag A has 1 black ball and 3 white balls, Bag B has 2 black balls and two white balls.

(a) What is the probability that two balls picked from bag A have different colors? Simplify your answer.

(b) What is the probability that two balls picked from bag B have different colors? Simplify your answer.

(c) Suppose you reached into a random bag and picked out two balls at random. If the two balls are different colors, what is the probability that you reached into bag B? Simplify your answer.

7. (16 points) Each Sunday a fisherman visits one of three possible locations near his home: he goes to the sea with probability $\frac{1}{2}$, to a river with probability $\frac{1}{4}$, or to a lake with probability $\frac{1}{4}$. If he goes to the sea there is an 80% chance that he will catch fish; corresponding figures for the river and the lake are 40% and 60% respectively.

(a) Find the probability that, on a given Sunday, he catches fish. Simplify your answer.

(b) If, on a particular Sunday, he comes home without catching anything, where is it most likely that he has been? Justify your answer.

SCRATCH PAPER