

Math 210

Fourth Hour Exam

Name _____

Friday Dec. 7
100 pts

I. Some probability

1. Some probability (5 pts. each)

a. What is the probability of drawing a five-card hand containing two kings and two fives?

b. Define $P(A|B)$

c. State Bayes' theorem

(problem #1, continued)

d. Suppose that we know the following:

The probability of passing an exam is 70%

60% of students study for exams

The probability of passing an exam if you study is 90%

The probability of passing an exam if you don't study is 30%

What is the likelihood that a student studied, given that the student passed the exam?

II. Relations

1. Definitions and short answer questions (5 pts. each)

a. What is a reflexive relation on a set A ? Give an example.

b. What is a transitive relation on a set A ? Give an example.

c. What is an equivalence relation? Give an example.

2. (5 pts.) Why is a relational database management called relational? To what extent is a relational database management system about relations? Use some examples as part of your answer.

3. (15 pts.) Identify each of the following relations as reflexive, symmetric, anti-symmetric, transitive, an equivalence (all that apply): For equivalence relations describe the equivalence classes.

a. $a \mid b$ (where a and b are integers, and \mid means "evenly divides" a and b).

b. (a relation amongst students) Student A and student B are taking the same class.

c. $A \subseteq B$ where A and B are subsets of some sizable set X .

2. (10 pts.) Complete the following multiplication table for the set of integers mod 3. In each case, indicate an equivalence class using the smallest positive number in that class (i.e., [0], [1], [2])

*	[0]	[1]	[2]
[0]			
[1]			
[2]			

III. Graph theory (all graphs are to be simple graphs)

1. Some definitions (5 pts. each)

a. A graph

b. Degree of a vertex

c. Bipartite graph. Sketch $K_{2,3}$

d. Wheel. Draw W_4 as an example.

(continuation of problem 1)

e. What is the handshaking theorem?

2. (10 pts.) Consider the following graph. Label edges and vertices and provide both an adjacency matrix and an incidence matrix.

