Name:

MATH 320: In-Class 5

Answer all questions. Show your work where necessary.

1. A student has three questions left on an exam. Each question is multiple choice with 4 options. If the student didn't study and randomly guesses for each of the remaining questions, find the following:

   (a) The probability that the student gets only the third question correct.

   (b) The probability that the student gets the first or the third question correct.

2. Two cards are drawn from a standard deck with replacement. Let $A1$ be the event the first card is an ace and $A2$ be the event the second card is an ace. Show that $A1$ and $A2$ are independent.

3. A company specializes in coaching people to pass a major professional examination. The company had helped 200 people last year. Their pass rates, based on type of the student, are shown in the following contingency table.

   Show if the type of student and pass / fail are independent using two different ways.

	Student	Professional	Total
Pass	48	72	120
Fail	50	30	80
Total	98	102	200

4. If A and B are independent events with $P(A) = 0.5$ and $P(B) = 0.2$, find the following:

   (a) $P(A \cup B)$.

   (b) $P(\sim A \cap \sim B)$.

   (c) $P(\sim A \cup \sim B)$.

5. Three inspectors look at a critical component of a product. Their probabilities of detecting a defect are 0.90, 0.92 and 0.95, respectively. Let I_j be the event that inspector j finds the defect, $j = 1, 2, 3$. Assuming mutual independence, find the following probabilities.

   (a) At least one inspector detecting the defect.

   (b) Only one inspector detects the defect.

   (c) Exactly two inspector detects the defect.

6. *(Challenge!)* An insurer offers a health plan to employees of a large company, where employees may choose *exactly two* of the supplementary coverages: A, B, or C, or no supplementary coverage. The proportions of employees that choose coverages A, B, and C are 1/4, 1/3, and 5/12, respectively.

   Find the probability that a randomly selected employee will choose no supplementary coverage.