Exam 2 PINK A. Miller Fall 98 Math 210

Show all work.
Explain your answers.
You may use a “dumb” calculator,
but one is not necessary.

Name______________________________

Circle the time of your TA section:

Tues 8:50 Tues 9:55 Thurs 8:50 Thurs 9:55

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<th>Problem</th>
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1. (16 %) A sound system is such that when it is used,

- the microphone malfunctions with probability .35,
- the speakers malfunction with probability .15, and
- both malfunction with probability .02.

What is the probability that either the microphone malfunctions or the speakers malfunction but not both?
2. (16 %) The events $X$ and $Y$ satisfy $Pr(X) = .4$ and $Pr(X \cup Y) = .7$ what is $Pr(Y)$ in the following cases:

(a) $X$ and $Y$ are disjoint.

(b) $X$ is a subset of $Y$.

(c) $X$ and $Y$ are independent.
3. (16 %) At the University of Michigan, 25% of the students have taken calculus in high school. Of those who have taken calculus in high school 55% plan to major in science. Of those who have not taken calculus in high school 10% plan to major in science. What is the probability that a randomly chosen student is planning to major in science?
4. (18 %) A used car lot contains
   20% Chevrolets,
   35% Dodges, and
   45% Fords.
Half of the Chevrolets, a fourth of the Dodges, and a tenth of the Fords are vans. A random automobile is chosen.

   (a) What is the probability that it is a van?

   (b) If it happens to be a van, what is the probability that it is a Ford?

   (c) If you buy this car and as you drive out of the lot it falls into two pieces, which piece do you own?
5. (16 %) A basketball player has probability .8 of making a free throw.

(a) If she attempts 5 free throws, what is the probability she will make exactly 1 of them?

(b) If she attempts 6 free throws, what is the probability she will make at least 2 of them?
6. (18 %) A kindergarten teacher has 12 boys and 7 girls. He picks three of them at random (without replacement). A random variable $X$ is defined to be the number of girls selected.

   (a) What are the possible values that $X$ can have?

   (b) What is the probability that $X = 3$?

   (c) Find the probability density function of $X$.

   (d) Find the expected value of $X$. 
Answers

1. .46
2. (a) .3 (b) .7 (c) .5
3. .2125
4. (a) .2325 (b) .19354839
   (c) I was with a friend who was buying a used car. He found one he liked for a thousand dollars and as he was negotiating with the salesman over price he asked if there was a guarantee or warranty. The salesman said, “My friend, if you buy this car and on the way out of the lot it falls into two pieces, then I guarantee that you will own both pieces.”
5. (a) .0064 (b) .9984
6. (a) {0, 1, 2, 3} (b) $p_3 = \frac{35}{969}$ (c) $p_0 = \frac{220}{969}$, $p_1 = \frac{462}{969}$, $p_2 = \frac{252}{969}$ (d) $\frac{1071}{969}$