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| Name: |
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Instructions:

- All answers must be written clearly.
- You may use a calculator, but you must show all your work in order to receive credit.
- Be sure to erase or cross out any work that you do not want graded.
- If you need extra space, you may use the back sides of the exam pages (if you do, please write me a note so that I know where to look).
- You must include all work to receive full credit.

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|-----------|---|---|---|---|---|---|-------|
| Question: | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| Points: | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Score: | | | | | | | |

1. A certain state has license plates showing three numbers (0 through 9) and three letters (A through Z). How many different license plates are possible:
 - (a) If the numbers must come before the letters?

- (b) If there is no restriction on where the letters and numbers appear?

2. Consider a standard deck of 52 cards.
- (a) A gin hand consists of 10 cards from a standard deck of 52 cards. Find the probability that a gin hand has all 10 cards of the same suit.
 - (b) Find the probability that a gin hand has a three pair. (e.g. *aabbccdefg*)
3. An urn contains 6 red, 4 blue, 8 green and 2 yellow balls. If a set of 4 balls is randomly selected (no replacement), what is the probability that each of the balls will be
- (a) The same color?
 - (b) Of different colors?

4. Independent flips of a coin that lands on heads with probability p are made. What is the probability that

(a) the first 10 outcomes are tails?

(b) the first 3 outcomes are heads?

(c) there are at least 1 heads in the first 10 outcomes?

5. A local college student goes to a bar 7 nights a week: 3 of the nights at bar A, 2 of the nights at bar B, and 2 of the nights at bar C. He'll get a girl's number 99 percent of the time at bar A, 96 percent of the time at bar B , and only 85 percent of the time at bar C.
- (a) On a random night of the week, what is the probability that he gets a girl's number?

- (b) Given that he doesn't get a girl's number, what is the probability that it was at bar C?

6. Show that if $\mathbb{P}(A) > 0$, then

$$\mathbb{P}(A \cap B \mid A) \geq \mathbb{P}(A \cap B \mid A \cup B).$$