

Name (PRINTED): \_\_\_\_\_

Student ID #: \_\_\_\_\_

Section # (or TA's: \_\_\_\_\_  
name and time)

CMSC 250

Exam #2 ANSWERS

Thurs., April 22, 2004

Write all answers legibly on the paper provided. If you need extra paper, raise your hand and request a blank paper – you must put your name on and hand-in any paper you receive. You can also use the back of the last page which is blank. Clearly label any answers that appear on a paper different from where the question appears. You must indicate the continuation of the answer on the paper where the question is and on the paper where the answer is continued. The number of points possible for each question is indicated in square brackets – the total number of points on the exam is 100, and you will have exactly 1.25 hours to complete this exam. In order to receive any partial credit, you must show your work, clearly labeled in the space provided. You may not use calculators, textbooks or any other external aids during this exam. The formula sheet is attached - this can be removed from the back of the exam and does not need to be handed in at the end.

Write the following University approved honor pledge and sign on the blank provided after you complete the exam. This must be done before we make the “stop writing now announcement.

I pledge on my honor that I have not given or received any unauthorized assistance on this examination.

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Sign Here: \_\_\_\_\_

\*\*\*\* This area is for grading purposes (points lost per page)- Do not write below this line \*\*\*\*

2	3	4	5	6	7	8	Total

1. [24 pnts.] Assume there are 25 balls in an Urn. 9 of them are red, 6 are blue, 1 is yellow, 5 are green and 4 are purple.

Answer the following questions about those balls - You must assume for all parts of this question that balls of the same color are indistinguishable from each other. You do not have to do the arithmetic, but you do have to get each answer into a form that includes ONLY addition, subtraction, multiplication, division, factorials and/or exponents: (Be sure to clearly label each of your answers.)

- a. [3 pnts.] If you were to draw all of the balls out of the urn one at a time placing them on the table in a straight line, how many different ways could that line look when you are done?

ANSWER:

$$\frac{25!}{9!6!1!5!4!} = \frac{25!}{9!16!} * \frac{16!}{6!10!} * \frac{10!}{1!9!} * \frac{9!}{5!4!} * \frac{4!}{4!0!}$$

- b. [3 pnts.] Assume one ball of each color fell off the table, and you were able to find 3 of them. How many different combinations of 3 balls might you have in your hand? (Assume the order you found the balls should not be considered here.)

ANSWER:

$$\binom{5}{3} = \frac{5!}{3!2!} = 10$$

- c. [3 pnts.] This question is the same as part b with the one exception that this time you need to consider the order you found the three balls.

ANSWER:

$$P(5, 3) = \frac{5!}{(5-3)!} = \frac{5!}{2!} = 60$$

- d. [3 pnts.] Assume the original 25 balls are back in the urn. You draw two balls out at the same time (there is no order between them). How many different combinations of 2 balls could you have in your hand?

ANSWER:

$$\binom{2+5-1}{2} - 1 = \frac{(2+(5-1))!}{2!(5-1)!} - 1 = \frac{6!}{2!4!} - 1 = \frac{6*5}{2} - 1 = 14$$

- e. [4 pnts.] Assume the original 25 balls are back in the urn. You draw two balls out at the same time (there is no order between them). What is the probability that you get two red ones?

ANSWER:

$$\frac{\binom{9}{2}}{\binom{25}{2}} = \frac{\frac{9!}{2!7!}}{\frac{25!}{2!23!}} = \frac{9 * 8}{25 * 24} = \frac{9}{75}$$

- f. [4 pnts.] Assume the original 25 balls are back in the urn. You draw six balls from the urn at the same time (there is no order between them). What is the probability that you do NOT have a set of balls that are all the same color in your hand??

ANSWER:

$$1 - \frac{\binom{9}{6} + \binom{6}{6}}{\binom{25}{6}} = 1 - \frac{\frac{9!}{6!3!} + \frac{6!}{6!0!}}{\frac{25!}{6!19!}} = 1 - \frac{19!(9! + 6!3!)}{3!25!}$$

- g. [4 pnts.] Assume the original 25 balls are back in the urn. You draw one ball from the urn and place it back into the urn, but remember what color it was. You then draw a single ball from the urn. What is the probability that the second ball drawn was the same color as you remember the first ball was?

ANSWER:

$$\left(\frac{9}{25}\right)^2 + \left(\frac{6}{25}\right)^2 + \left(\frac{1}{25}\right)^2 + \left(\frac{5}{25}\right)^2 + \left(\frac{4}{25}\right)^2$$