

Professor Peter A. Rejto

Name (Print): _____ Student ID number: _____
Section number: _____ Name of TA: _____
Signature: _____

7 pages. Show all work. No work no credit. No books/notes. Calculators: Scientific calculator are allowed. However, graphing calculators are not allowed. More specifically, calculators that display two or more lines are not allowed.

Additional Information:

1. If your answer involves one or more symbols, please define them. If you have an answer, there is no need to write it as a decimal number.
2. Let E and F be events in the same sample space. Recall that $P(E/F)$, the conditional probability of E with condition F is defined by:

$$P(E/F) = \frac{P(E \cap F)}{P(F)}.$$

Here, as usual, $E \cap F$ denotes the intersection of the sets E and F , $P(E \cap F)$ is the probability of this intersection and $P(F)$ is the probability of $P(F)$.

1. (15 pts.) We define a mathematical banana split as a collection of 3 scoops of ice cream, where the order of the scoops does matter. For example, the mathematical banana split consisting of chocolate, vanilla and strawberry is different from the one of strawberry, vanilla and chocolate. Find the number of possible mathematical banana splits that can be made out of the 31 flavors of Baskin Robbins.

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2. (15 pts.) An artist has 7 paintings. In how many different orders can the artist arrange these 7 paintings?

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3. (15 pts.) A certain club consists of 6 men and 5 women. How many ways are there to form a committee of 6 people if a certain pair of men refuse to serve on the same committee? Hint: one way to solve this problem is to count the total number of committees, and then subtract the number for which both men are members.

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4. Let S be the sample space associated with the experiment of tossing two coins and let E be the event of getting at least one head.

(a) (10 pts.) Find S and E in terms of outcomes.

(b) (5 pts.) Assume that each of these two coins are fair. Find $P(E)$, the probability of the event E .

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5. (20 pts.) Two cards are drawn at random from a deck of 52 cards, without replacement. What is the probability of getting at least one ace ?

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6. (20 pts.) An unfair coin is tossed. The probabilities are

$$P(\text{heads}) = \frac{3}{4}, \quad P(\text{tails}) = \frac{1}{4}.$$

If heads comes up, you draw a ball from an urn containing 4 green balls and 4 yellow balls. If tails comes up, you draw a ball from an urn containing 5 green balls and 10 yellow balls. Find the probability of drawing a yellow ball.