Assignment 3: Basic Probability

Your name here

PSTAT 194TR

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Instructions

This assignment does not require any code to be written. You can complete these theory problems by hand or you may type these up in latex, Rmd as per your choice.

You only need to upload a .PDF of a photo or scan of your handwritten work or typed up work.

STRATEGY: for getting started with probability problems

Working through probability problems can seem difficult at first. Use this strategy as you think critically about your approach to solve these problems.

- Write down events in words. Let A be the event ....
- Write down the probabilty you want to calculate in math notation using the events you defined. Like: Want to calculate $P(A \cap B)$
- Are these events independent? multiply probabilities or use multiplication rule
- Are these events mutually exclusive? add probabilities or use addition rule
- If the number of ways your event can unfold is long and complicated, look at the complement.

Once you have asked these questions, it'll be a matter of applying the correct formula.

Thinking critically to get answers to these questions is the challenging part of probability. With practice, this will get easier and become second nature!

Exercise 1:

a. Draw 2 cards with replacement. What's the chance of getting two red cards?
b. Draw 2 cards without replacement. What's the chance of getting two red cards?
c. Draw 2 cards without replacement. What's the chance of getting the first red and second not red?

Exercise 2:

The table shows the results of a study in which researchers examined a child's IQ and the presence of a specific gene in the child.

	Gene Present	Gene Absent	Total
High IQ	33	19	52
Normal IQ	39	11	50
Total	72	30	102

Find the probability that...

(a) ... a child has a high IQ, given the child has the gene.
(b) ...a child has the gene.
(c) ...a child has a high IQ, and the child has the gene.

Exercise 3:

CD's in a music shop are classified as: classical, pop, rock, folk and jazz. The probability that a customer buying one CD will choose classical is 0.3, pop 0.4, rock 0.2, folk 0.05 and jazz 0.05

a) Find the probability that a customer will choose a classical, folk or jazz CD.
b) Find the probability that a customer will NOT choose a classical, folk or rock CD.

Assume each CD can only be classified in one section

Exercise 4:

A fair six sided die is thrown 4 times. Find the probability that a 5 is obtained each time.