

Name: _____
MATH 107
Winter 2022
HW 16: Due 01/19

*“There are two kinds of statistics: the
kind you look up and the kind you make
up.”*

–Rex Stout

Problem 1. (10pt) A bag contains 15 red marbles and 15 blue marbles. Explain why the probability of drawing two red marbles in a row without replacement is *not* $\frac{15}{30} \cdot \frac{15}{30}$.

Problem 2. (10pt) The grades of students in a large Calculus class are broken down by academic year below:

	A	B	C	D	F
Freshman	1	1	4	8	5
Sophomore	9	7	8	5	4
Junior	8	5	3	1	0
Senior	4	1	1	0	0

- (a) What is the probability that a randomly selected student received an A?
- (b) What is the probability that a randomly selected student was a Freshman that failed the class?
- (c) What is the probability that a randomly selected student was a Sophomore or received a C?
- (d) What is the probability that a randomly selected student received a B, assuming that they were a Junior?

Problem 3. (10pt) In a small neighborhood, 20 houses have a pool, 42 have a garage, and 16 have both. There are 68 houses in the neighborhood.

- (a) Find the probability that a randomly selected house has neither a pool nor a garage.
- (b) Find the probability that a randomly selected house only has a garage.
- (c) Find the probability that a randomly selected house has a pool or a garage.
- (d) Find the probability that a randomly selected house has a garage, if it has a pool.

Problem 4. (10pt) Suppose that 12% of people have a genetic abnormality. If you have a abnormality, a test will identify it 95% of the time. However, there is an 8% chance you will be identified as having an abnormality by the test when you do not have one.

- (a) Find the probability that a randomly selected person will test positive for a genetic abnormality.
- (b) Find the probability that a randomly selected person will test negative for a genetic abnormality.
- (c) Find the probability that a randomly selected person has a genetic abnormality and will test positive.
- (d) Find the probability that a randomly selected person has a genetic abnormality, assuming that they tested positive.

Problem 5. (10pt) Watch Stand-Up Math's "[Bayesian Statistics with Hannah Fry](#)" on YouTube. Being as detailed as possible, comment on what you learned and how it relates to the course material.