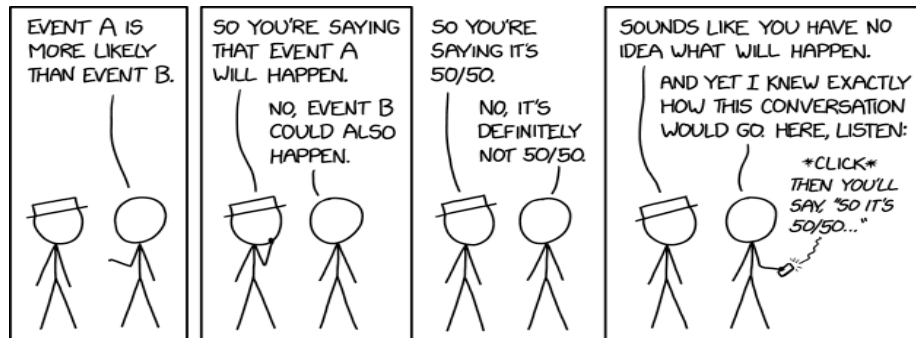


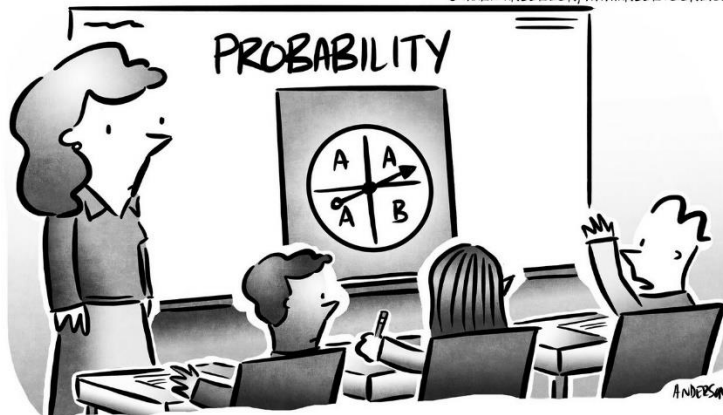
Name: _____

Problem	1	2 / 3	4	5 / 6	7 / 8	Total
Possible	20	25	20	21	14	100
Received						

DO NOT OPEN YOUR EXAM UNTIL TOLD TO DO SO.
You may use a 3 x 5 card (both sides) of handwritten notes and a calculator.
FOR FULL CREDIT, SHOW YOUR WORK.



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"I know mathematically that A is more likely, but I gotta say, I feel like B wants it more."

20 points 1. Suppose that the average weight of a certain type of corn seed is normally distributed with a mean of 40 mg and a standard deviation of 10 mg.

/4 (a) What fraction of these seeds are heavier than 35 mg?

/2 (b) What is the probability that an individual seed would be heavier than 35 mg?

/4 (c) What fraction of seeds' weights are between 25 and 35 mg?

/4 (d) What seed weight is at the 30th percentile?

/4 (e) What seed weight is at the 90th percentile?

/2 (f) What fraction of seeds' heights are between the heights you found in (d) and (e)?

15 points 2. Same info from Problem 1: suppose that the average weight of a certain type of corn seed is normally distributed with a mean of 40 mg and a standard deviation of 10 mg.

/7 (a) If you take a sample of 9 seeds, find $\Pr\{37 \leq \bar{Y} \leq 46\}$, the probability that the sample mean \bar{Y} will be between 37 and 46 mg.

/8 (b) Given the four probabilities:

$$a = \Pr\{35 \leq \bar{Y} \leq 45\}, \text{ where } n = 100$$

$$b = \Pr\{30 \leq \bar{Y} \leq 50\}, \text{ where } n = 100$$

$$c = \Pr\{30 \leq \bar{Y} \leq 50\}, \text{ where } n = 200$$

$$d = \Pr\{35 \leq Y \leq 45\} \text{ for a single value } Y$$

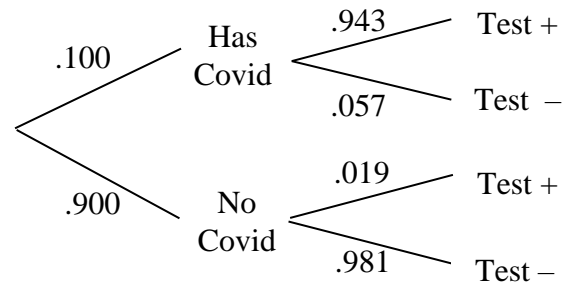
Write a, b, c, d in decreasing order (largest value to smallest):

10 points 3. Find the expected value μ_Y and standard deviation σ_Y given the following probability distribution for random variable Y . Show all pertinent work.

k	$\Pr\{Y = k\}$
-1	.4
3	.2
7	.4

20 points 4. For the iHealth Covid-19 Antigen Rapid Test, a positive result is accurate 94.3% of the time, and a negative test is accurate 98.1% of the time. Suppose that approximately 10% of the population currently has Covid.

Find the four missing values in the table below.
Show all pertinent work below the table.



	Results of test		
	No Test	Positive	Negative
Probability person <u>has</u> Covid	.100		
Probability person <u>does not</u> have Covid	.900		

Show all pertinent work below.

For example, this value is $\Pr\{No Covid | Test-\}$

13 points 5. Suppose that approximately 10% of the population has Covid. You take a sample of 5 persons. Let Y denote the number of persons in the sample with Covid. Find each of the following.

/3 (a) $\Pr\{Y = 3\} =$

/7 (b) $\Pr\{Y > 3\} =$

/3 (c) $\Pr\{Y < 3\} =$

8 points 6. We are interested in hair color vs. eye color.

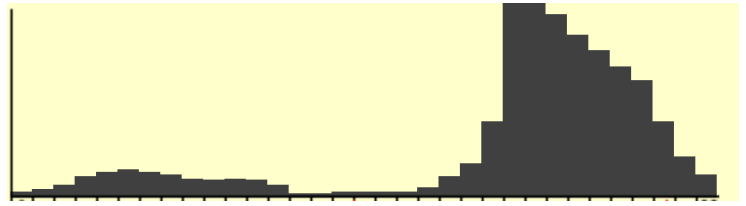
/2 (a) Find $\Pr\{\text{Brown Eyes}\}$.

		Hair color			Total
		Brown	Black	Red	
Eye Color	Brown	400	300	200	900
	Blue	800	600	400	1,800
	Total	1,200	900	600	2,700

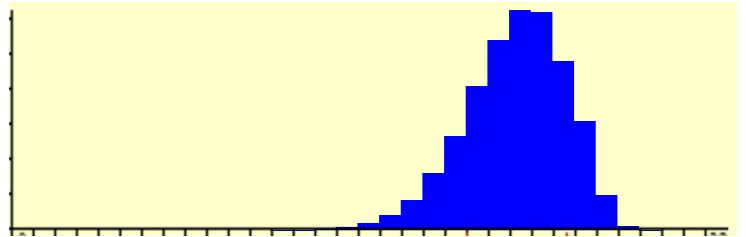
/3 (b) Find $\Pr\{\text{Brown Eyes} | \text{Red Hair}\}$.

/3 (c) Are *Brown Eyes* and *Red Hair* independent traits or not? Explain/show work.

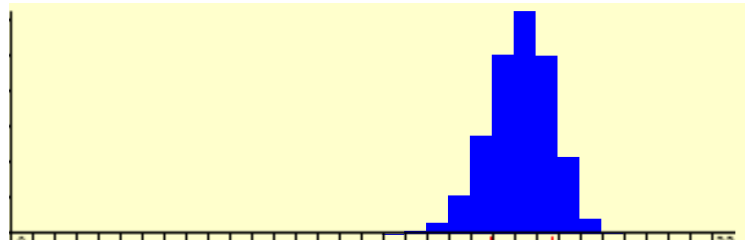
9 points 7. The population distribution at right has a mean of 23 and a standard deviation of 7. The sampling distributions using $n = 2$, $n = 10$ and $n = 25$ are shown below right (not in that order).



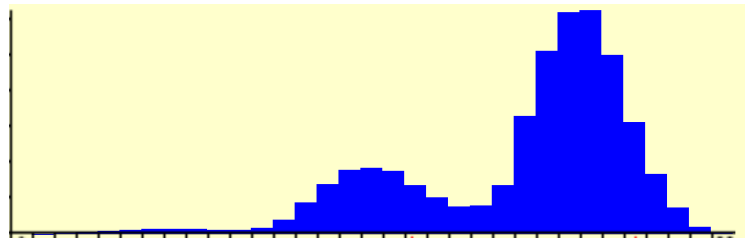
$n =$
 $mean =$
 $SD =$



$n =$
 $mean =$
 $SD =$



$n =$
 $mean =$
 $SD =$



5 points 8. Estimate the mean and standard deviation of the data shown in the histogram at right.

