INSTRUCTOR:
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This test has 4 questions, for a total of 30 points, and you have **75 min** to answer the questions.

READ THE QUESTIONS CAREFULLY
In order to get full credit you must SHOW YOUR WORK
Answer the questions in the spaces provided on the question sheets.

Non-graphing calculators are allowed. No textbook, laptops, cell phones, or other electronic devices are permitted.

Last Name, First Name (print). _____

Student Number _____

Signature: _____

Question	Points	Score
1	10	
2	4	
3	7	
4	9	
Total:	30	

1. Answer the following questions;

[2] (a) Suppose the number of tornadoes to occur in a certain region follows a Poisson distribution with an average of 2 per year. What is the probability that less than 3 tornadoes will occur in this region in any 2 year period?

[1] (b) What is the number of possible arrangements of the letters in the word **"distributions"**?

[2] (c) United Airlines Flight 433 is a nonstop flight from Boston's Logan airport to San Francisco International Airport. An important factor in scheduling such flights is the actual airborne flying time from takeoff to touchdown. Suppose the airborne flying time is distributed as normal with mean 370 minutes and standard deviation 16 minutes. What is the probability that the airborne flying time is more than 383 minutes in one day?

2 (d) The standard deviation for a data set is 10. If each observation in the data set is multiplied by 3, calculate the variance of the resulting data set.

2 (e) In a certain population, 30% are smokers. If a random sample of 60 individuals is selected from the population, find the expected number of smokers (E[S]) **and** the variance of the number of smokers (V(S)) in the sample.

1 (f) The weight of adult male grizzly bears living in the wild in the continental United States is approximately normally distributed with a mean of 500 pounds and a standard deviation of 50 pounds. The weight of adult female grizzly bears is approximatly normally distributed with a mean of 300 pounds and a standard deviation of 40 pounds. Approximately, what would be the weight of a female grizzly bear with the same standardized score ($z-$score) as a male grizzly bear with a weight of 530 pounds?

2. 1% of a population have a certain genetic defect. 90% of tests for the gene detect the defect (true positives). 9.6% of the tests are false positives.

[2] (a) What is the probability that a tested individual will have a positive test result?

[2] (b) If a person gets a positive test result, what is the probability they actually have the genetic defect?

3. The number of car accident fatalities in any one week period is a random variable X having probability distribution
P(X=x)=$p(x)$ where

x	2	3	4	5
$p(x)$	0.15	0.35		0.2

[1] (a) Fill in the blank in the table above.

[2] (b) Find P(X $<$ 4).

[4] (c) Find the standard deviation of X.

4. The probability density function for a certain type of measurement Y is given by

$$f(y) = \frac{k}{y^2}, \quad \text{if } 1 \leq y \leq 2$$

and $f(y) = 0$, otherwise.

[3] (a) Determine the value of k.

[2] (b) Find $E[Y^3]$.

[4] (c) Find $F(y)$, and use this result to find $P(1.5 < Y \leq 2)$