

Math 193: Practice for Test 3

1. According to the Vancouver Canucks' website (www.canucks.com), the number of goals scored by their top ten scorers in a past year are as follows: 36, 24, 23, 20, 18, 14, 12, 12, 12, 11.
 - (a) State the mean and median of this data set.
 - (b) Suppose that in the next game or games, the highest and lowest numbers of goals (36 and 11) each increased by two while all of the other data points stayed the same. What would happen to the mean and median? Be as specific as you can!
2. Consider the following sets of data. Without calculating any values, indicate which set will have the higher standard deviation (or will they be the same?).
 - (a) Set 1: 1, 3, 5, 7, 9
Set 2: 1, 2, 3, 4, 5
 - (b) Set 1: 1, 3, 5, 7, 9
Set 2: 11, 13, 15, 17, 19
 - (c) Set 1: 1, 4, 5, 6, 9
Set 2: 3, 4, 5, 6, 7
 - (d) Set 1: 22, 23, 24, 25, 26
Set 2: 15, 20, 25, 30, 35
3. The Gizmo Store is having a sale of its Bluetooth-enabled widgets which range in price from \$25 to \$75, with every widget having a different price. Answer the following questions, being as specific as you can!
 - (a) If every widget is reduced in price by \$10, what happens to the mean, median, and standard deviation of the widget prices?
 - (b) If, instead, the least expensive widget is reduced in price by \$10, what happens to the mean, median, and standard deviation of the widget prices?
 - (c) If, instead, every widget is reduced in price by 10%, what happens to the mean, median, and standard deviation of the widget prices?
4. An individual is presented with three different glasses of soft drink, labeled A, B, and C. He is asked to taste all three and then list them in order of preference. Suppose that the same soft drink has actually been put into all three glasses.
 - (a) How many simple events are there in this experiment? What probability would you assign to each event?
 - (b) What is the probability that A is ranked first?
 - (c) What is the probability that either B or C is ranked first?
 - (d) What is the probability that A is ranked first or B is ranked last?

5. Students either from the Computing Systems Technology program or from the English department were asked who is the greatest fictional wizard ever, with the following results.

	Gandalf	Dumbledore
CST	77	63
English	33	27

- What is the probability that a randomly selected student chose Gandalf?
 - What is the probability that a randomly selected student studies CST?
 - What is the probability that a randomly selected student studies English and chose Dumbledore?
 - What is the probability that a randomly selected student neither studies English nor chose Dumbledore?
6. A computer system requires a case-sensitive, alpha-numeric password containing six characters.
- How many passwords are there that contain no “A”s?
 - How many passwords are there that contain no “a”s?
 - How many passwords are there that contain no “A”s or no “a”s or both?

7. Consider the random variable x with the following probability distribution:

x	$p(x)$
5	0.25
10	0.65
15	

- Complete the table above by filling in the missing entry.
 - Calculate the mean and standard deviation of x .
8. You can insure a \$50,000 diamond for its total value by paying a premium of \$1250. If the insurance company’s expected gain is \$1000 per insurance policy, what is the probability of theft for this diamond?
9. For each of the following experiments, state whether it is a binomial experiment by writing Y (yes) or N (no).
- Counting the number of buses that stop at your bus stop before the one with the route you want shows up.
 - Standing by the coffee kiosk and, for the next ten people, noting whether that person brought their own mug.
 - Surveying 100 random students at lunch to ask whether they got to school by driving, by taking the bus, or by biking/walking.

- (d) Flipping a fair coin and recording the results, stopping once youve got three heads in a row.
 - (e) Flipping an unfair coin and recording the results for 20 trials.
10. The average number of dandelions in Pat's front lawn is six.
- (a) Let x be the number of dandelions found in her lawn today. What is the name of the probability distribution that would best describe x ?
 - (b) Using the distribution youve chosen, calculate the probability that there is more than one dandelion in Pat's front lawn today.
11. An airline finds that, on average, 5% of the persons wh have purchased tickets for a certain flight will not show up. If a Dash 8 making the flight from Victoria to Seattle only seats 50 passengers and the number of tickets sold equals the number of seats on the plane, calculate the following probabilities.
- (a) Calculate the probability that the plane will be completely full.
 - (b) Calculate the probability that there will be at least one empty seat.
 - (c) Calculate the probability that there will be exactly two empty seats.
12. A soft-drink machine is regulated so that it discharges an amount of liquid which is a uniform random variable with values between 190 and 210 mL.
- (a) Calculate the fraction of drinks dispensed that will have a volume greater than 195 mL.
 - (b) Calculate the mean and standard deviation of the volume of liquid this machine dispenses.

13. Suppose that some phenomenon has the following probability distribution.

$$f(x) = \begin{cases} \frac{k}{1+x^2} & \text{for } 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

Calculate the following, giving your answer to three decimal places.

- (a) Calculate k so that $f(x)$ is indeed a probability distribution function.
 - (b) Calculate the probability of x being between $\frac{1}{\sqrt{3}}$ and 1.
 - (c) Calculate the mean value of x .
14. The mayor of Victoria was informed that household water usage is a normally distributed random variable with mean of 25 gallons/day and a standard deviation of 6 gallons/day.
- (a) If the mayor wants to give a tax rebate to the lowest 20% of water users, what should the gallons/day cutoff be?

- (b) Calculate the probability that a randomly-chosen household will use more than 27 gallons per day.
15. A publisher has discovered that the number of words contained in a manuscript by an experienced author are normally distributed, with a mean equal to the number specified in the authors contract and a standard deviation of 5,000 words. If the publisher wants to be almost certain (say, with a 95% probability) that the manuscript will have less than 75,000 words, what number of words should the publisher specify in the contract?