STAT 2040 DE: Assignment 1

Due: June 6, 2021 at 11:59 pm. Late assignment will not be accepted.

Question 1 (2 marks)

Find the five-number summary of the dataset:

{31, 46, 37, 32, 32, 41, 28, 28, 28, 28, 42}

Question 2 (2 marks)

The insect *Megamelus scutellaris* can feed on the sap of the water hyacinth, and it has been used as a method of biocontrol for this invasive plant species. *M. scutellaris* mates on the water hyacinth, and females create oviposition scars on the plant, laying one or more eggs in each scar. In one aspect of this study, the number of eggs laid per scar was measured. The observed number of eggs per scar for 359 scars is given in the Table below.

1 egg/scar	2 eggs/scar	3 eggs/scar	4 eggs/scar
142	194	9	14

a) What is the mean number of eggs per scar?
b) What is the median number of eggs per scar?
c) What is the standard deviation of the number of eggs per scar?

Question 3 (2 marks)

According to the Canadian Animal Health Institute, 58% of households have at least one pet (dog or cat). Suppose you're a mailperson delivering mail on a street with 6 households.

a) What is the probability that none of the households have at least one pet? (0.5 marks)
b) What is the probability that exactly 2 of the households have at least one pet? (0.5 marks)
c) Assume 1% of pets bite the mailperson. What is the probability that delivering to one house will result in an animal bite? (1 mark)

Question 4 (2 marks)

The CN Tower and Canada's Wonderland are two attractions in Southern Ontario. A recent survey indicated that 45% of people have been to the CN Tower, 55% of people have been to Canada's Wonderland, and 25% have been to both.

You randomly select a person who completed the survey. Let T = the person has been to the CN Tower and let C = the person has been to Canada's Wonderland.

a) What is the probability that the person has been to at least one of these two sites? (1 mark)
b) What is the probability that the person has only been to one of the sites? (1 mark)

Question 5 (2 marks)

A restaurant claims their customers spend on average 75 minutes at their restaurant with a standard deviation of 13. The restaurant manager has also confirmed that the distribution of time spent in the restaurant is normally distributed.

a) Suppose your visit is 90 minutes due to a high volume of diners. Is there any reason to believe that the restaurant manager's claim is false? Use a z-score to justify your answer. (1 mark)
b) Suppose your waiting time is 120 minutes. Is there any evidence that the claim is false now? (1 mark)

Question 6 (2 marks)

Assume you are drawing cards from a well-shuffled standard deck of cards without replacement.

a) What is the probability of drawing a flush (a poker hand composed of five cards of the same suit)? (0.5 marks)
b) What is the probability of drawing a flush given the first two cards drawn are hearts? (0.5 marks)
c) What is the probability of drawing a second flush given a flush was just drawn from the deck? (1 mark)

Question 7 (2 marks)

The grades of 11 students from a ninth grade English class were sampled.

78, 91, 88, 87, 66, 90, 64, 71, 80, 72, 71

a) Determine the mean, median and mode of the sample. (1 mark)
b) Determine the variance and standard deviation of the sample. (0.5 marks)
c) State the mathematical relationship between variance and standard deviation. (0.5 marks)