DMC 106: Homework 2

Due Date: Wednesday, September 10th

Problem 1 (20 Points): Below is a data matrix detailing the fate of the passengers of the Titanic. The passengers are tabulated by what class fare they had purchased and whether they survived or not.

Table 1: **Titanic Survival by Passenger Class**.

	Class			
Survival?	1st	2nd	3rd	Total
Yes	136	87	119	342
No	80	97	372	549
Total	216	184	491	891

(a) What percentage of all passengers survived?

(b) What percentage of 1st Class passengers survived?

(c) What percentage of 2nd Class passengers survived?

(d) What percentage of 3rd Class passengers survived?

(e) What is a major takeaway from your answers to questions (b)-(d)? Hint: your answer should describe a relationship between the variables listed in Table 1.

(f) Draw a two-variable mosaic plot for "Survival?" and "Class".

Problem 2 (10 Points): In a class of 20 students, 18 of them took an exam in class and 2 students took a make-up exam the following day. The professor graded the first batch of 18 exams and found a mean score of 77 points with a standard deviation of 7.3 points. The students who took the make-up exam the following day scored 85 and 92 points on the exam respectively.

(a) Do the two make-up scores increase or decrease the existing class mean? Explain your logic *without* recomputing the entire class mean.

(b) What is the (recomputed) mean score of the class now?

(c) Do the two make-up scores increase or decrease the standard deviation of the scores?

Problem 3 (20 Points): Below is a table consisting of sales data from a restaurant across multiple days of the week. Answer the following questions.

Table 2: **Restaurant Dataset Across Days of the Week**.

Day	Total Bill ($)	Day	Total Bill ($)
Thur	10.3	Sat	20.1
Thur	15.0	Sat	25.5
Thur	18.2	Sat	30.2
Thur	21.0	Sat	19.8
Thur	13.5	Sat	22.0
Fri	9.5	Sun	24.5
Fri	12.8	Sun	19.3
Fri	16.5	Sun	28.0
Fri	14.2	Sun	17.5
Thur	14.5	Sun	23.0
Thur	17.8	Sun	21.5
Thur	11.2	Sun	31.0
Fri	18.0	Sun	29.5
Fri	15.7	Sun	27.0
Sat	26.5	Sun	25.8

(a) Compute the mean, variance, and standard deviation of the total bill *for each day of the week listed* (*i.e.,* statistics for Thursday, Friday, Saturday, and Sunday).

(b) Draw a multi-variable box plot for the given dataset (*i.e.,* a box plot for each day, all on the same plot).

Problem 4 (10 Points): Below, solve each of the following probability questions regarding playing cards. As a reminder, there are 52 cards in a deck and 13 cards of each suit (Hearts, Diamonds, Spades, and Clubs). Assume that we have one deck of cards.

(a) What is the probability of drawing a King of Hearts?

(b) What is the probability of drawing an Ace or a Hearts card?

(c) What is the probability of drawing a card with value between 2 and 6?

Problem 5 (15 Points): Below, solve each of the following probability questions regarding dice. As a reminder, each dice has six sides and is numbered 1-6.

(a) What is the probability of rolling two dice and getting a sum of 5?

(b) What is the probability of rolling two dice and getting two sixs?

(c) What is the probability of rolling two dice and getting doubles of a kind (*i.e.* any pair of numbers).

(d) What is the probability of rolling two dice and their sum is neither 6 *nor* 7?

(e) What is the probability of rolling a 4, then rolling a 5, then rolling a 6?

Problem 6 (20 Points): Data collected at elementary schools in DeKalb County, GA suggest that each year roughly 25% of students miss exactly one day of school, 15% miss 2 days, and 28% miss 3 or more days due to sickness.

(a) What is the probability that a student chosen at random doesn't miss any days of school due to sickness this year?

(b) What is the probability that a student chosen at random misses no more than one day?

(c) What is the probability that a student chosen at random misses at least one day?

(d) If a parent has two kids at a DeKalb County elementary school, what is the probability that neither kid will miss any school? Note any assumption you must make to answer this question.

(e) If a parent has two kids at a DeKalb County elementary school, what is the probability that both kids will miss some school, *i.e.* at least one day? Note any assumption you make.

(f) If you made an assumption in part (d) or (e), do you think it was reasonable? If you didn't make any assumptions, double check your earlier answers.

Problem 7 (Fermi, 5 Points): How many hot dogs are sold at M&T Bank Stadium (Ravens Stadium) during a single football *regular* season? Be sure to show your steps!