Name: _____

ISE 390 Final

August 5, 2022

Summer 2022 Opened Book

I understand that I am not allowed to talk to another student during this exam.

I understand that looking at someone else's exam is cheating.

I understand if I talk during the exam to another student or look at their paper, I will receive a zero on this exam and that academic misconduct charges will be filed against me. If I am found guilty of academic misconduct, I acknowledge I will receive an F in this course and may also have other sanctions imposed on me (see student handbook).

Signature:

Write neatly. If I cannot read it, you will receive no credit.

It would be best to take this quiz in pencil but if you use a pen that you cannot erase you better get the right answer the first time!

1. (20 points) A coin is tossed twice. Let Z denote the number of heads on the first toss and W the total number of heads on the 2 tosses. If the coin is unbalanced and a head has a 40% chance of occurring, find

   (a) the marginal distribution of W;
   (b) the marginal distribution of Z;
   (c) the probability that at least 1 head occurs.

2. (20 points) Two levels (low and high) of insulin doses are given to two groups of diabetic rats to check the insulin binding capacity, yielding the following data:

$$\begin{array}{lccc} \text{Low dose:} & n_1 = 8 & \bar{x}_1 = 1.98 & s_1 = 0.51 \\ \text{High dose:} & n_2 = 13 & \bar{x}_2 = 1.30 & s_2 = 0.35 \end{array}$$

   Assume that the variances are equal. Give a 95% confidence interval for the difference in the true average insulin-binding capacity between the two samples.

3. (20 points) Test the hypothesis that the average content of containers of a particular lubricant is 10 liters if the contents of a random sample of 10 containers are 10.2, 9.7, 10.1, 10.3, 10.1, 9.8, 9.9, 10.4, 10.3, and 9.8 liters.
   Use a 0.01 level of significance and assume that the distribution of contents is normal.

4. (15 points) In a study to estimate the proportion of residents in a certain city and its suburbs who favor the construction of a nuclear power plant, it is found that 63 of 100 urban residents favor the construction while only 59 of 125 suburban residents are in favor. Is there a significant difference between the proportions of urban and suburban residents who favor construction of the nuclear plant? Use a 0.05 level of significance.

5. (25 points) Two types of instruments for measuring the amount of sulfur monoxide in the atmosphere are being compared in an air-pollution experiment. The following readings were recorded daily for a period of 2 weeks:

	Sulfur Monoxide	
Day	**Instrument *A***	**Instrument *B***
1	0.96	0.87
2	0.82	0.74
3	0.75	0.63
4	0.61	0.55
5	0.89	0.76
6	0.64	0.70
7	0.81	0.69
8	0.68	0.57
9	0.65	0.53
10	0.84	0.88
11	0.59	0.51
12	0.94	0.79
13	0.91	0.84
14	0.77	0.63

Using the normal approximation to the binomial distribution, perform a sign test to determine whether the different instruments lead to different results. Use a 0.05 level of significance.