

Introduction to Probability and Statistics Final Exam**SHOW ALL WORK TO RECEIVE FULL CREDIT**

1. (10) What is the value of k in the following CDF?

$$F(x) = \begin{cases} 0 & x \leq 0 \\ (10 - kx)x^9 & 0 < x < 1 \\ 1 & x \geq 1 \end{cases}$$

2. (10) Find the expected value of the following pdf

$$f(x) = 2 \left(1 - \frac{1}{x^2} \right) \quad 1 < x < 2$$

3. (10) Students arrive to class with an inter-arrival time that is exponentially distributed with a mean of 1.5min. Data is collected for two classes each day (30 inter-arrival times). How are the average inter-arrival times for a class distributed?

4. (10) Coca-Cola bottling company must put 20oz. of soda in each bottle. If there is too little, customers are upset. If there is too much, the company loses money. A quality engineer takes a random sample of 30 bottles with mean 20.2 and std dev of 0.2. Are there any problems with the bottling process?

5. (20) Fill in the three red blanks with the correct values

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.914467103
R Square	
Adjusted R Square	0.825333421
Standard Error	2.051510168
Observations	17

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	1	322.3990022	322.399	76.6031
Residual	15	63.13040953	4.208694	
Total	16	385.5294118		

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-1.493174557	0.961315755	-1.55326	0.141202
X Variable 1	0.630845193	0.072077486		

Figure 1: Regression Stat Output

6. (10) A random sample of 100 recorded deaths in the United States during the past year showed an average life span of 71.8 years, with a sample standard deviation of 8.9 years. Does the sample seem to indicate that the average life span today is greater than 70 years?

7. (20) Weights for a certain rodent population are normally distributed with an unknown mean μ . A random sample of size 20 yields a sample mean weight of 18.5 ounces and a sample standard deviation of 16 ounces. Find a 96% CI for the true mean rodent weight. Include a sketch of the appropriate probability distribution and critical p-values with your answer.

8. (10) The time in days between breakdowns of the company's e-mail server is exponentially distributed with $\lambda = 0.2$. What is the expected time between server breakdowns? What is the probability that the server will break down within 5 days of its last failure? What is the probability that after the server is repaired it lasts a week before failing again? If the server has performed satisfactorily for six days, what is the probability that it lasts at least two additional days before breaking down?