Math 220 : Elementary Statistics Kane Nashimoto
Exam 2 - Ch. 5, 6, 7
Fall 2006 Name : _____

Directions: This exam contains five problems worth a total of 100 points. For each computational problem, you must first write the formula to be used and present all your subsequent work in order to receive full or partial credit. Circle your final answers.

1. Of all the students at a large university, 46% are male, 67% prefer morning classes, and 29% are male and prefer morning classes.

   (a) If you select one student at random, what is the probability that the student is male, prefers morning classes, or both? (7 pts.)

   (b) Suppose that a randomly selected student is male. What is the probability that he prefers morning classes? (7 pts.)

   (c) If you select three students independently, what is the probability that at least one of them is male? (7 pts.)

   (d) Are the two events "selected student is male" and "selected student prefers morning classes" independent? Justify your answer. (7 pts.)

2. The heating cost for a company office in the winter season varies according to a normal distribution with mean $\mu = 450$ dollars and standard deviation $\sigma = 15$.

   (a) What proportion of the time will the heating cost be higher than 425 dollars? (8 pts.)

   (b) How much should the company budget for heating so that the actual cost will be within the budget 90% of the time? (8 pts.)

3. Shown below are nighttime-low and daytime-high temperatures (in degrees Fahrenheit) for seven cities.

Nighttime low	42	48	33	44	39	34	38
Daytime high	73	72	65	81	76	80	66

(a) Use your calculator's built-in function to compute the Pearson correlation coefficient between the two variables. (7 pts.)

(b) Use your calculator's built-in function to obtain the least-squares regression equation for predicting the daytime-high temperature (Y) from the nighttime-low temperature (X). (7 pts.)

For (a) and (b), if you prefer, you may perform computation by hand. Take as given:

$$\sum x = 278\,;\ \sum y = 513\,;\ \sum x^2 = 11214\,;\ \sum y^2 = 37831\,;\ \sum xy = 20423$$

Show your work on the backside of page 3.

4. At a local restaurant, 25% of the customers order Daily Special. Suppose that you take orders for 20 customers at this restaurant. Assume that customers place orders independently.

(a) Find the probability that fewer than 5 customers will order Daily Special. (7 pts.)

(b) Find the probability that exactly 7 customers will order Daily Special. (7 pts.)

(c) Find the probability that more than 2 but fewer than 10 customers will order Daily Special. (7 pts.)

(d) *Extra credit - do only if you have extra time.* Find the probability that more than 15 customers will order anything other than Daily Special. (2 pts.)

5. Featured below are the results of a regression analysis examining the relationship between weight of a vehicle (x; in tons) and tire-pressure specification (y; in PSI).

   (a) What proportion of the variability in tire pressure is explained by the current regression model? (7 pts.)

   (b) Report the value of the "standard deviation about the least-squares line." (7 pts.)

   (c) Predict the tire pressure (in specification) for a vehicle that weighs 1.42 tons. (7 pts.)

Figure 1. SPSS output for Problem 5.

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Vehicle weight[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Tire pressure

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.436[a]	.190	.100	2.618

a. Predictors: (Constant), Vehicle weight

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.496	1	14.496	2.115	.180[a]
	Residual	61.686	9	6.854		
	Total	76.182	10			

a. Predictors: (Constant), Vehicle weight

b. Dependent Variable: Tire pressure

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	28.278	2.206		12.820	.000
	Vehicle weight	1.667	1.146	.436	1.454	.180

a. Dependent Variable: Tire pressure