Math 220 : Elementary Statistics — Kane Nashimoto
Exam 2 - Ch. 5, 6, 7
Summer 2007 — Name : _____

Directions: This exam contains six 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. An insurance fraud investigator discovered that on average 1 out of 10 claims contained questionable items. Assume that the investigator's observation is reasonably accurate. You will randomly select 20 claims sent to an insurance company during a recent month.

   (a) What is the probability that exactly 5 claims will contain questionable items? (8 pts.)

   (b) What is the probability that between 3 and 6 claims (inclusive) will contain questionable items? (8 pts.)

   (c) What is the probability that all 20 claims will contain questionable items? (8 pts.)

2. In a community, 37% of all residents are smokers. Suppose that you randomly select five residents from this community. What is the probability that at least one of them will be a smoker? Hint: Use complement. (8 pts.)

3. The density of the lean body tissue of a human is approximately normally distributed with mean $\mu = 1.10\,\mathrm{g/cm^3}$ and standard deviation $\sigma = 0.02\,\mathrm{g/cm^3}$.

   (a) What percentage of the people have lean-body-tissue densities greater than 1.13 $\mathrm{g/cm^3}$? (10 pts.)

   (b) Find the 25th percentile point of the lean-body-tissue density. (10 pts.)

4. Featured below are highest temperatures (y) and lowest temperatures (x) for seven days in a city.

x	61	58	54	46	51	60	58
y	81	76	78	79	75	76	82

   (a) Using your calculator's built-in function, compute the least-squares regression equation for predicting the highest temperature from a lowest temperature. (6 pts.)

   (b) Using your calculator's built-in function, compute the Pearson correlation coefficient between the two sets of temperature values. (6 pts.)

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

$$\sum x = 388\,;\ \sum y = 547\,;\ \sum x^2 = 21682\,;\ \sum y^2 = 42787\,;\ \sum xy = 30336$$

   Show your work on the backside of this page.

5. Of all the families in a suburb of a large city, 55% have more than one child, 16% own a minivan, and 13% have more than one child and own a minivan.

   (a) If a randomly selected family has more than one child, what is the probability that the family owns a minivan? (8 pts.)

   (b) If a family is selected at random, what is the probability that it has more than one child, owns a minivan, or both? (8 pts.)

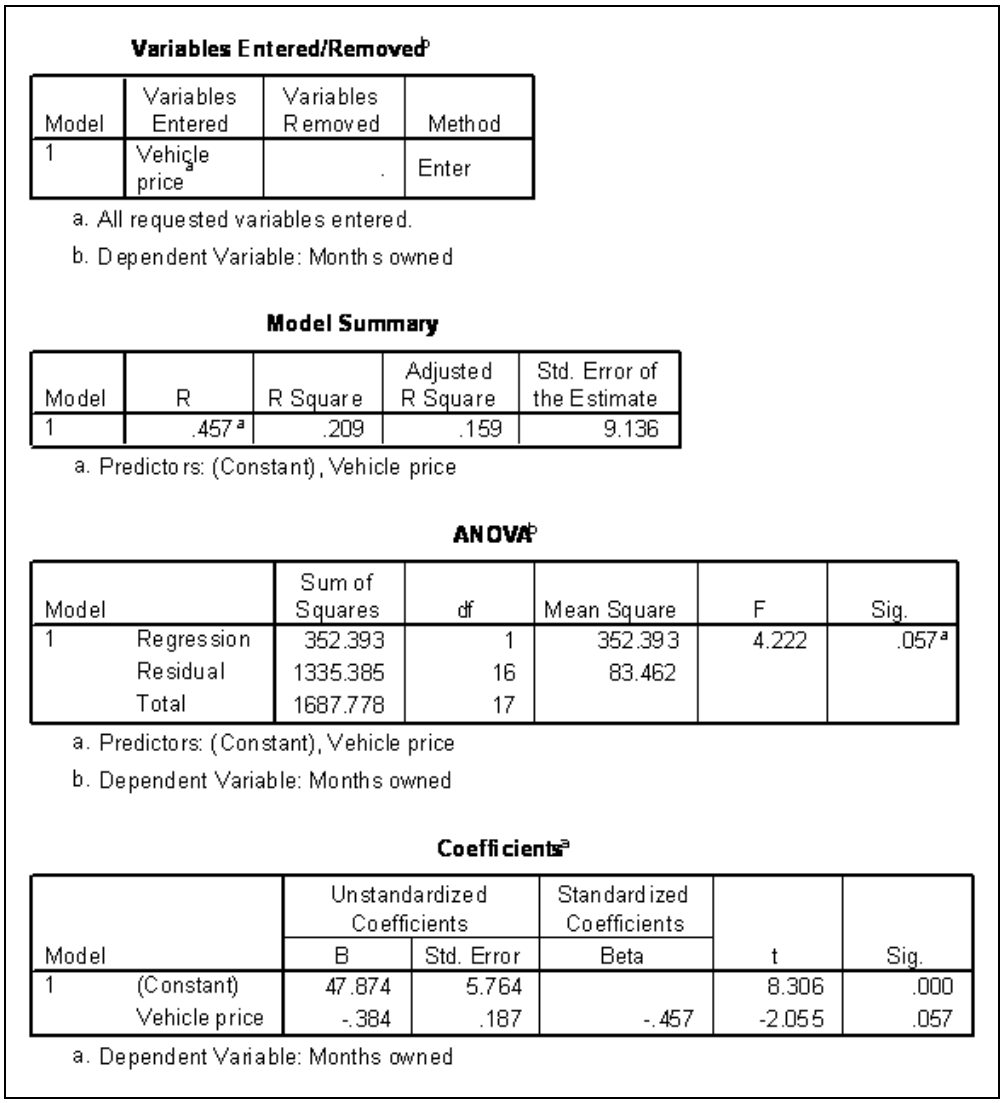
   (c) Are the two events "selected family has more than one child" and "selected family owns a minivan" independent? Justify your answer mathematically. (8 pts.)

6. For randomly selected 18 cars that were recently traded in at a dealership, the relationship between X = original price of the vehicle (in thousand dollars) and Y = length of ownership (in months) was examined using a regression framework. The results of the regression analysis are given on page 4.

   (a) Report the value of the "standard deviation about the least-squares line." (6 pts.)

   (b) Predict the length of ownership for vehicle whose original price is 30 thousand dollars. (6 pts.)

Figure 1. SPSS output for Problem 6.



Variables Entered/Removed[b]

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

a. All requested variables entered.

b. Dependent Variable: Months owned

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.457[a]	.209	.159	9.136

a. Predictors: (Constant), Vehicle price

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	352.393	1	352.393	4.222	.057[a]
	Residual	1335.385	16	83.462		
	Total	1687.778	17			

a. Predictors: (Constant), Vehicle price

b. Dependent Variable: Months owned

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47.874	5.764		8.306	.000
	Vehicle price	-.384	.187	-.457	-2.055	.057

a. Dependent Variable: Months owned