

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. The actual octane level of a mid-grade gasoline has a normal distribution with mean $\mu = 89.21$ and standard deviation $\sigma = 0.17$. Suppose that 40 samples of this gasoline will be taken and their octane levels measured.

(a) What proportion of the samples will have octane levels lower than 89.50? (8 pts.)

(b) Thirty percent of the samples will have octane levels higher than x . Find the value of x . (8 pts.)

2. Shown below are smoking status (0 = nonsmoker; 1 = smoker) and number of caffeinated drinks consumed in a typical week for a sample of seven students.

Smoking status	0	0	0	0	1	1	1
Number drinks	2	1	5	4	5	9	4

(a) Use your calculator's built-in function to obtain the least-squares regression equation for predicting the number of caffeinated drinks (Y) from the smoking status (X). (6 pts.)

(b) Use your calculator's built-in function to compute the Pearson correlation coefficient between the two variables. (6 pts.)

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

$$\sum x = 3; \sum y = 30; \sum x^2 = 3; \sum y^2 = 168; \sum xy = 18$$

Show your work on the backside of page 3.

3. The following table cross-classifies the total of 1943 students at a college according to their gender and financial-support status.

Gender	Financial-support status		
	Self-supported	Parent-supported	Via financial aid
Female	155	221	657
Male	118	138	654

- (a) If a student is selected at random from this college, what is the probability that the student will be female, given that the student receives financial aid? (8 pts.)
- (b) If a student is selected at random, what is the probability that the student will be male, parent-supported, or both? (8 pts.)
- (c) If two students are selected independently, what is the probability that both of them will be self-supported? (8 pts.)
- (d) Are the two events “selected student is male” and “selected student receives financial aid” independent? Justify your answer. (8 pts.)
4. It is estimated that 20% of all school children in America are lefthanded. Let us assume that this estimate is reasonably accurate. Consider a random sample of 13 school children taken from the population.
- (a) Compute the probability that fewer than 3 children in the sample will be left-handed. (8 pts.)
- (b) Compute the probability that between 6 and 9 children (inclusive) will be left-handed. (8 pts.)
- (c) Compute the probability that more than 5 children will be righthanded. (8 pts.)

5. Featured below are the results of a regression analysis on the data collected in our class survey. Sixty-four students responded how much money they spent for textbooks (in dollars) for Fall 2005 (X) and for Spring 2006 (Y).
- (a) If a student has spent \$425 for textbooks for Fall 2005, what is his or her predicted expenditure for Spring 2006? (8 pts.)
- (b) Interpret the value of the coefficient of determination in the context of the problem. (8 pts.)

Figure 1. SPSS output for Problem 5.

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Fall 2005 ^a	.	Enter

a. All requested variables entered.
b. Dependent Variable: Spring 2006

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.092 ^a	.008	-.008	125.223

a. Predictors: (Constant), Fall 2005

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8218.510	1	8218.510	.524	.472 ^a
	Residual	972206.4	62	15680.749		
	Total	980424.9	63			

a. Predictors: (Constant), Fall 2005
b. Dependent Variable: Spring 2006

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	308.354	71.308		4.324	.000
	Fall 2005	.124	.171	.092	.724	.472

a. Dependent Variable: Spring 2006