

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. Of all the employees in a company, 68% are male, 37% hold managerial duties, and 29% are male and hold managerial duties. Suppose that you select one employee at random from this company.
 - (a) What is the probability that the selected person will be male, given that the person holds a managerial duty? (8 pts.)

 - (b) What is the probability that the selected person will be male, hold a managerial duty, or both? (8 pts.)

 - (c) Are the two events “selected person is male” and “selected person holds a managerial duty” independent? Justify your answer. (8 pts.)

2. It is estimated that 30% of all school children in America are obese. Let us assume that this estimate is reasonably accurate, and suppose that you take a random sample of 15 school children.
 - (a) Compute the probability that less than or equal to 5 children in the sample will be obese. (8 pts.)

 - (b) Compute the probability that exactly 7 children in the sample will be obese. (8 pts.)

 - (c) Compute the probability that more than 4 children in the sample will be obese. (8 pts.)

3. A family has four children. You have not met the children yet and, of course, you do not know their genders. What is the probability that at least one of the children is a girl? Assume $P(\text{boy}) = P(\text{girl}) = .5$. (8 pts.)

4. Presented below are data on two quiz scores for a sample of seven students.

Quiz 1	8	6	6	4	10	7	9
Quiz 2	7	6	7	5	7	7	8

- (a) Use your calculator's built-in function to obtain the least-squares regression equation for predicting Quiz 2 score (Y) from Quiz 1 score (X). (6 pts.)
- (b) Use your calculator's built-in function to compute the Pearson correlation coefficient between the two sets of quiz scores. (6 pts.)

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

$$\sum x = 50; \sum y = 47; \sum x^2 = 382; \sum y^2 = 321; \sum xy = 345$$

Show your work on the backside of page 3.

5. It is estimated that heights of adult males are normally distributed with a mean of 70.0 inches and a standard deviation of 3.5. In one state, the law requires a person to be 68.0 inches or taller to become a firefighter.
- (a) What percentage of adult males will meet this height requirement for becoming a firefighter? (8 pts.)
- (b) A person who was denied to become a firefighter learned that his height was at the 25th percentile. What is his actual height? (8 pts.)

6. Featured below are the results of a regression analysis on the data for Ex. 5.42 of the textbook. In the analysis, $Y =$ crop yield (in tons per hectare) is modeled as a function of $X =$ crop duration (in days) for soybeans.

(a) Is the relationship between X and Y positive or negative? Explain why? (8 pts.)

(b) Report the value of the “standard deviation about the least-squares line” and interpret the value in the context of the problem. (8 pts.)

Figure 1. SPSS output for Problem 6.

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.940 ^a	.883	.868	.2044	

a. Predictors: (Constant), Crop duration

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.522	1	2.522	60.341	.000 ^a
	Residual	.334	8	.042		
	Total	2.856	9			

a. Predictors: (Constant), Crop duration
b. Dependent Variable: Crop yield

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.207	.471		11.047	.000
	Crop duration	-.034	.004	-.940	-7.768	.000

a. Dependent Variable: Crop yield