

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 object known to weigh precisely 10 kilograms is repeatedly put on an old household scale. The scale reading has some variability. In particular, it has an approximate normal distribution with mean  $\mu = 10.05$  and standard deviation  $\sigma = 0.02$ .

(a) What percent of the time will the scale reading be greater than 10.08 kilograms?  
(8 pts.)

(b) Thirty-three percent (33%) of the time the scale reading will be less than  $x$  kilograms. Find the value of  $x$ . (8 pts.)

2. Shown below are  $X =$  midterm score and  $Y =$  final-exam score for a sample of  $n = 10$  students in a physics class.

$x$	68	79	84	98	57	77	84	83	91	76
$y$	72	76	83	90	62	78	84	87	90	82

(a) Use your calculator to compute the Pearson correlation coefficient,  $r$ , between  $X$  and  $Y$ . (6 pts.)

(b) Take as given:  $\bar{x} = 79.70$ ;  $\bar{y} = 80.40$ ;  $s_x = 11.47$ ;  $s_y = 8.72$ . Using these statistics and the correlation coefficient obtained in (a), find the regression equation for predicting  $Y$  from  $X$ . Show work. (8 pts.)

3. A total of 987 workers at a company are cross-classified according to gender (male, female) and type of duty (managerial, supervision, labor).

Gender	Type of duty		
	Managerial	Supervision	Labor
Female	7	33	132
Male	49	106	660

- (a) Compute the conditional percentages of the three types of duties for male and female workers separately. (8 pts.)
- (b) Based on the conditional percentages obtained in (a), how would you describe the association between gender and type of duty? (8 pts.)
4. Of all members of a local credit union, 92% of them have checking accounts, 77% have savings accounts, and 72% have both checking and savings accounts.
- (a) Find the probability that a randomly selected member of this credit union has a checking account, savings account, or both. (6 pts.)
- (b) Find the probability that a randomly selected member has a checking account, given that he or she has a savings account. (6 pts.)
- (c) Are the events “selected member has a checking account” and “selected member has a savings account” independent? Justify your answer. (6 pts.)

5. It is estimated that approximately 40% of working individuals invest portions of their money into stocks. Assume that this estimate is reasonably accurate. Suppose that you take a random sample of 15 working individuals.
- (a) Find the expected number of individuals who invest their money into stocks. (6 pts.)
  
  - (b) Find the probability that less than or equal to 5 individuals invest their money into stocks. (6 pts.)
  
  - (c) Find the probability that none of the individuals invest their money into stocks. (6 pts.)
  
  - (d) Find the probability that exactly 10 individuals invest their money into stocks. (6 pts.)
6. From a sample of 26 students attending a private college, information on age and number of online courses previously completed was obtained. Age ranged from 18 to 50 years, and number of online courses ranged from 1 to 18. A regression analysis was conducted on the data. The results of the analysis are presented on the following page.
- (a) Interpret the value of the coefficient of determination,  $r^2$ , in the context of the problem. (6 pts.)
  
  
  
  
  
  
  
  
  
  
  - (b) Predict the number of online courses previously completed for a student who is 42 years old. (6 pts.)

Figure 1. SPSS output for Problem 6.

Variables Entered/Removed <sup>a</sup>			
Model	Variables Entered	Variables Removed	Method
1	Age <sup>a</sup>	.	Enter

a. All requested variables entered.  
b. Dependent Variable: Online Courses

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.752 <sup>a</sup>	.566	.548	3.255

a. Predictors: (Constant), Age

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	331.135	1	331.135	31.258	.000 <sup>a</sup>
	Residual	254.250	24	10.594		
	Total	585.385	25			

a. Predictors: (Constant), Age  
b. Dependent Variable: Online Courses

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.784	2.693		-1.405	.173
	Age	.402	.072	.752	5.591	.000

a. Dependent Variable: Online Courses