Prince Sultan University

Deanship of Educational Services
Department of Mathematics
and General Sciences

COURSE DETAILS:

Statistics and Probability Theory	STAT 101	MAJOR II
Semester:	Spring Semester --Term 172	
Date:	April 17, 2018	
Time Allowed:	**90 minutes**	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section/Time	
Instructor's Name:	Dr. Mohammed Kaouache Dr. Eric Benson

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 2	Page 3	Page 4	Page 5	Page 6	Page 7	Total
Questions	**10**	**15**	**15**	**15**	**15**	**10**	**80**
Marks							

10 points

1. The National Safety Council (NSC) estimates that off-the-job accidents cost U.S. businesses almost $200 billion annually in lost productivity (National Safety Council, March 2006). Based on NSC estimates, medium size companies are expected to average three employee off-the-job accidents per year. Answer the following questions for medium size companies employees.
   a. What is the probability of no off-the-job accidents during a one-year period? **(2 points)**

   b. What is the probability of at least two off-the-job accidents during a one-year period? **(3points)**

   c. What is the expected number of off-the-job accidents during six months? **(3 points)**

   d. What is the probability of two or less off-the-job accidents during the next six months? **(2 points)**

15 points

2. Abdulazziz and Abdullah both solve difficult computer problems that come to the student desk. Abdulaziz makes 65% of the repairs and Abdullah 35%. However, Abdulaziz's repairs are incomplete 4% of the time and Abdullah's are incomplete 6% of the time.
   a. Determine the probability that a repair is incomplete. **(5 points)**

   b. If a repair is found to be incomplete, what is the probability that the repair was made by Abdulaziz? **(5 points)**

   c. If a repair is found to be complete, what is the probability that the repair was made by Abdullah? **(5 points)**

15 points

3. A university found that 20% of its students withdraw without completing the introductory statistics course. Assume that 20 students registered for the course.
   a. Compute the probability that two or fewer will withdraw. **(3 points)**

   b. Compute the probability that exactly four will withdraw. **(4 points)**

   c. Compute the probability that more than three will withdraw. **(4 points)**

   d. Compute the expected number and standard deviation of withdrawals. **(4 points)**

15 points

4. The average stock price for companies making up the S&P 500 is $30, and the standard deviation is $8.20 (BusinessWeek, Special Annual Issue, Spring 2003). Assume the stock prices are normally distributed.

   a. What is the probability a company will have a stock price of at least $40? **(5 points)**

   b. What is the probability a company will have a stock price no higher than $20? **(5 points)**

   c. How high does a stock price have to be to put a company in the top 10%? **(5 points)**

15 points

5. In an article about the cost of health care, Money magazine reported that a visit to a hospital emergency room for something as simple as a sore throat has a mean cost of $328 (Money, January 2009). Assume that the cost for this type of hospital emergency room visit is normally distributed with a standard deviation of $92. Answer the following questions about the cost of a hospital emergency room visit for this medical service.

   a. What cost is more than 60% of all the costs? **(4 points)**

   b. What cost is exceeded by 95% of all the costs? **(4 points)**

   c. What is the probability that the cost will be between $300 and $400? **(3 points)**

   d. If the cost to a patient is in the lower 8% of charges for this medical service, what was the cost of this patient's emergency room visit? **(4 points)**

10 points

6. A fair coin is tossed. If2,3,or 5 occurs, the player wins that number of riyals, but if 1,4,or 6 occurs the player loses that number of riyals. The possible payoffs for the player and their respective probabilities follow:

x	2	3	5	-1	-4	-6
$\Pr(X=x)$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

a. Find the expected value (mean) of x. **(2 points)**

b. Find the standard deviation of x. **(2 points)**

c. Find $\Pr(-1 \le x < 3)$. **(3 points)**

d. Find the probability that x lies between 1.5 standard deviation of the mean. **(3 points)**