Prince Sultan University

Deanship of Educational Services
Department of Mathematics
and General Sciences

COURSE DETAILS:

Statistics and Probability Theory	STAT 101	Major 1
Semester:	Fall Semester --Term 181	
Date:	October 15, 2018	
Time Allowed:	**90 minutes**	

STUDENT DETAILS:

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

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**	**20**	**15**	**10**	**5**	**20**	**80**
Marks							

10 points

1. A population of unknown shape has a mean of 80 and a standard deviation of 15.

a. Using the Tchebysheff's theorem, determine the range of values that should include at least 96% of the values of this population. **(6 points)**

b. If the median of this population is 76, what is the shape of the distribution of this population? **(4 points)**

20 points

2. Consider the following data:
   23, 65, 45, 19, 35, 28, 39, 75, 50, 26, 25, 27, 24, 17, 12, 106, 23, 19, 39, 70, 20, 18, 44, 31

   a. Find the 88^{th} percentile for the data. **(3 points)**

   b. Find the mean and the standard deviation. Determine the percentage of the data that fall in the interval $\bar{x} \pm 2s$. **(5 points)**

   c. Determine the standardized value for 106. **(2 points)**

   d. Calculate the coefficient of variation. **(2 points)**

   e. Construct a box and whisker plots for the data. **(6 points)**

   f. Describe the shape of the distribution. Identify any outlier. **(2 points)**

3. Suppose that we have a sample space with six equally likely experiment outcomes: **15 points**

$S=\{u,v,w,x,y,z\}$ Let $A=\{x,y,z\}$ $B=\{u,v,w\}$ and $C=\{u,x,y,w\}$

a. Find $\Pr(A)$ $\Pr(B)$ $\Pr(C)$ **(3 points)**

b. Find $\Pr(A\cup B)$. Are A and B mutually exclusive? **(4 points)**

c. Find $\Pr(A\cup \overline{B})$ **(4 points)**

d. Find $\Pr(B\cup C)$. Are B and C mutually exclusive? **(4 points)**

10 points

4. If $P(X)=0.35$, $P(Y)=0.65$, and $P(X|Y)=0.4$.

(a) **(3 points)** Are *X* and *Y* independent? Explain.

(b) **(2 points)** Are *X* and *Y* mutually exclusive? Explain.

(c) **(3 points)** Find $P(Y|X)$

(d) **(2 points)** Find $P(Y \cup X)$

5. For a grouped frequency distribution of 6 classes, the cumulative relative frequencies are:
0.15, 0.27, 0.38, 0.6, 0.92, 1
If the sample size is 500, find the frequency of each class. **(5 points)**

20 points

6. **Soccer Injuries** During the inaugural season of Major League Soccer in the United States, the medical teams documented 256 injuries that caused a loss of participation time to the player. The results of this investigation, reported in The American Journal of Sports Medicine, are shown in the table.

Severity	Practice (P)	Game (G)	Total
Minor (A)	66	88	154
Moderate (B)	23	44	67
Major (C)	12	23	35
Total	101	155	256

If one individual is drawn at random from this group of 256 soccer players, find the following probabilities:

a. $\Pr(A)$ **(4 points)**

b. $\Pr(A \cup C)$ **(4 points)**

c. $\Pr(G \mid A)$ **(4 points)**

d. $\Pr(P \mid G)$ **(4 points)**

e. $\Pr(\bar{B})$ **(4 points)**