Prince Sultan University

STAT 101

Major Test II

Semester II, Term 162

Monday, April 24th, 2017

Time Allowed: **90** minutes

Student Name: _____

Student ID #: _____

Teacher's Name: _____Section #: _____

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard
6. Looking around or making an attempt to cheat will result in your exam being cancelled
7. This examination has 8 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1, 2	10, 10	
3, 4	15, 5	
5, 6	10, 10	
7, 8	15, 5	
Total	**80**	

Q1. 10pts) An experimenter publishing in the Annals of Botany investigated whether the stem diameters of the dicot sunflower would change depending on whether the plant was left to sway freely in the wind or was artificially supported. Suppose that the unsupported stem diameters at the base of a particular species of sunflower plant have a normal distribution with an average diameter of 35 millimeters (mm) and a standard deviation of 3 mm.

a. What is the probability that a sunflower plant will have a basal diameter of more than 40 mm? (5 pts)

b. What diameter represents the 90th percentile of the distribution of diameters? (5pts)

Q2. 10pts) Bits are sent over a communications channel in packets of 12. If the probability of a bit being corrupted over this channel is 0.1 and the number of corrupted bits follow a binomial distribution.

a. What is the probability that no more than 2 bits in a packet are corrupted? (5 pts)

b. Let X denote the number of corrupted bits. What is the probability that X will exceed its mean by more than 2 standard deviations? (5 pts)

Q3. 15pts) The number x of people entering the intensive care unit at a particular hospital on any one day has a Poisson probability distribution with mean equal to five persons per day.

a. What is the probability that the number of people entering the intensive care unit on a particular day is two? (5pts)

b. What is the probability that the number of people entering the intensive care unit on a particular day exceeds its mean by more than one standard deviation? (5pts)

c. What is the expected number of people entering the intensive care unit on a particular week? (5pts)

Q4. 5pts) X is a discrete random variable with the following probability distribution.

x	-1	0	2
$\Pr(X = x)$	0.1	?	?

Determine P(X=0) and P(X=2) given that the expected value of X is 0.5.

Q5. 10pts) Suppose that the random variable *x* is normally distributed with mean $\mu = 360$ and standard deviation $\sigma = 120$. For each of the following find the value x_0. In each case, draw a sketch.

a. $\Pr(x > x_0) = 0.05$ (5pts)

b. $\Pr(x \le x_0) = .9772$ (5pts)

Q6. 10ps) Bowl A contains 2 red chips; bowl B contains two white chips; and bowl C contains 1 red chip and 1 white chip. A bowl is selected at random, and one chip is taken at random from that bowl.

a. What is the probability of selecting a white chip? (5pts)

b. If the selected chip is white, what is the probability that the other chip in the bowl is red? (5pts)

Q7. 15pts) The probability distribution shown represents the number of trips of five nights or more that American adults take per year. (That is, 6% do not take any trips lasting five nights or more, 70% take one trip lasting five nights or more per year, etc.).

Number of trips x	0	1	2	3	5
Probability $\Pr(X = x)$	0.06	0.70	0.20	?	0.01

a. Find P(X=3) and then Find the mean. (5pts)

b. Find the standard deviation. (5pts)

c. Find the probability of being within one standard deviation of the mean. (5pts)

Q8. 5pts) Suppose that the random variable *X* is normally distributed with mean $\mu = 80$ and standard deviation σ. What is the value of σ if $P(X > 90) = 0.10$