BUSINESS STATISTICS (STAT 2606) ASSIGNMENT #3

SECTIONS A & B: DUE MONDAY, NOVEMBER 3 IN CLASS
SECTION C: DUE TUESDAY, NOVEMBER 4 IN CLASS

INSTRUCTIONS: For written questions, show all of your work. No credit will be given for answers without justification. Do not use SAS for a question unless it specifically says to do so. In case exact numbers are unavailable in probability tables, choose the closest ones.

1. Suppose that a random variable, say X, follows a uniform distribution between 200 and 240.

(A) Determine the probability density function f(x).

(B) $P[100 < X < 220] = ?$

(C) If $P[X > x] = 0.4$, what is the value of x?

(D) Compute the mean and standard deviation of X

2. It is known that an exam score of STAT 2606 follows the normal distribution with mean 70 and variance 400.

(A) If the passing mark is 50, what is the probability that a randomly selected student will fail in this exam?
(B) What is the probability that a student will get exactly 70?
(C) What is the minimum score for a student to be in the top 10 percent?
(D) Determine the interquartile range of this distribution.

3. According to a research, the average number of hours of TV viewing per household per week in Canada is 50.4 hours. Its standard deviation is 14 hours. Consider a random sample of 49 households.

(A) Find the mean and standard deviation of the sample average.
(B) Describe roughly the shape of the distribution of the sample average. Justify your answer.
(C) What is the approximate probability that the sample average will be more than 52 hours?
(D) Assume the standard deviation is not given. If the approximate probability that the sample mean will exceed 49 hours is 0.6554, what is the population standard deviation?

4. A basket ball player's success rate of free throw shooting is 0.70. Suppose he attempts 120 free throws independently.

(A) Find the mean and variance of the number of successful throws.
(B) What is the approximate probability that he will succeed in at least 90 throws.
(C) Find the approximate probability that he will succeed in exactly 100 throws.

5. A bank teller has information that customers are arriving at her counter at a rate of 0.2 (persons/minute). She also knows that interarrival time between any two consecutive customers follows an exponential distribution.

(A) Find the mean and standard deviation of the interarrival time of customers.
(B) Since there was no customer when she finished a service, she wanted to leave her counter for a coffee break. If her break time is 5 minutes, what is the probability that there will be one or more customers waiting for service?

6. Suppose 10 percents of Grade 10 students fail in the Ontario Literacy Test.

(A) If four Grade 10 students are randomly selected, what is the probability that the number of failed students among them is less than or equal to one.

(B) Now suppose we randomly select 400 Grade 10 students. Then what are the mean and standard deviation of the sample proportion of students who failed in the test?

(C) In the same situation as (B), what is the approximate probability that the sample proportion of failed students will be less than or equal to 0.25?

7. SAS QUESTION

In both case, put a foot note that shows your name and ID number.

(A) Use the SAS function RANUNI(seed) to generate 200 data values from a uniform distribution between 20 and 100. Using these observations, draw a histogram to see the shape of distribution. The following SAS codes can be used for this.

```
FOOTNOTE 'Name ID number';
DATA uniform;
DO i=1 to 200;
x = 20+(100-20)*RANUNI(0);
OUTPUT;
END;
RUN;
PROC CHART;
VBAR x;
RUN;
```

(B) Take 200 random samples of size 30 from uniform distribution between 20 and 100, and keep these 200 sample means. 1) Draw a histogram of those sample means and compare this with the histogram in (A). 2) Which theory can be illustrated by doing this? 3) In the program below, determine the mean and standard deviation of Y.

(Include only Histogram when you submit your assignment.)

```
FOOTNOTE 'Name ID number';
DATA sample;
DO i=1 to 200;
    DO j=1 to 30;
    X = 20+(100-20)*RANUNI(0);
    OUTPUT;
   END;
END;
RUN;
PROC MEANS;
VAR X;
By i;
OUTPUT OUT=new mean=Y;
RUN;
PROC CHART;
VBAR Y;
RUN;
```