DAYSTAR UNIVERSITY

SCHOOL OF BUSINESS & ECONOMICS
January Semester 2020   MAT610X: Quantitative Techniques
Assignment Two

Answer all the Questions

Question One

When asked if grades are "curved" Professor Makanyanga replies that she uses the normal curve as a guide in assigning letter grades to large classes. She first finds the average numerical grade and the standard deviation of the numerical grades, and then assigns the letter grades as follows:

Numerical grades (X) interval	Grade
$X \geq \mu + 1.5\sigma$	A
$\mu + 0.5\sigma \leq X < \mu + 1.5\sigma$	B
$\mu - 0.5\sigma \leq X < \mu + 0.5\sigma$	C
$\mu - 1.5\sigma \leq X < \mu - 0.5\sigma$	D
$X < \mu - 1.5\sigma$	F

i)   In a class of 900, approximately how many students will receive each letter grade? Give your answer to the nearest whole number.   **(8 marks)**

ii) The professor finds that the class average is 65 with a standard deviation of 7. What is the lowest passing numerical score between 0 and 100 that will receive a B?   **(2 marks)**

Question Two

Given the population of five numbers

9   15   9   12   6

(i)   Compute and tabulate the sampling distribution of the mean for samples of size *n=2* and show that $\mu_{\bar{x}} = \mu_x$ **(5 marks)**

(ii) Compute and tabulate the sampling distribution of the proportion for samples of size *n = 3* if success is defined as getting an odd number. From the distribution obtained show that $\mu_{\bar{p}} = p$ **(5 marks)**

Question Three

The results of a particular examination are given below in summary form:

        Passed with distinction   12.1%

        Passed   67%

        Failed   20.9%

Its known that a candidate gets grade E (fails) if he/she obtains less than 41% while he/she must obtain at least 91 marks in order to pass with distinction. Determine the mean and standard deviation of the distribution of marks assuming this to be normal.

(10 marks)

Question Four

(a)   Weekly demand for eggs stocked by Waumini grocers is normally distributed. The mean is 1200 trays and standard deviation is 200 trays. How many trays should be available for a week if Waumini wants to ensure that the probability of running out of stock does not exceed 5%? **(5 marks)**

(b)   The marks of the students in a certain examination are normally distributed with mean marks as 40% and standard deviation marks as 20%. On this basis, 60% of the students failed. The result was moderated and 70% of the students passed. Find the pass marks before and after the moderation. **(5 marks)**

Question Five

(a)   Suppose a friend says, "I know the formula for computing the standard error of the mean, but I don't understand what the standard error really is." Write a note to your friend explaining what the standard error really is. **(2 marks)**

(b)   In human engineering and product design, it is often important to consider the weights of people so that airplanes or elevators aren't overloaded, chairs don't break, and other such dangerous or embarrassing mishaps do not occur. Given that the population of men has normally distributed weights, with a mean of 68 kg and a standard deviation of 12kg, find the probability that:

      (i)   If 1 man is randomly selected, his weight is greater than 70kg.

(4 marks)

      (ii)   If 36 different men are randomly selected, their mean weight is greater than 72kg.

(4 marks)

Question Six

The experiment of a telephone salesman is that 10% of his calls lead to a sale and that each call is independent of all other calls. Calculate the probability that he makes:

    (a)   exactly no sales in 12 calls   **(3 marks)**

    (b)   makes fewer than 4 sales in 15 calls.   **(7 marks)**

Question Seven

A company that supplies ready-mix concrete receives, on average, 6 orders per day,

    (a)   What is the probability that on a given day:

        (i)   No orders will be received?

        (ii)   No more than 2 orders will be received?

        (iii)   At least 3 orders will be received?   **(6 marks)**

    (b)   What is the probability that on a given half-day, no orders will be received?   **(2 marks)**

    (c)   What is the mean and standard deviation of orders received per day?   **(2 marks)**