INTENSIVE REVISION QUESTIONS (ERQ)
SET 19-PROBABILITY DISTRIBUTIONS 1
Name :…….
Form :……
Teacher:…….

1. A random variable, X, has a binomial distribution with $n = 4$ and $p = 0.4$.
   (a) Find the probability distribution of X.
   (b) Hence, plot the graph of the distribution of X. [5 marks]

2. X is a random variable having a binomial distribution with n trials and p as the probability of success. Given that
   (a) $n = 4$ and $p = 0.4$, find $P(X = 3)$,
   (b) $n = 5$ and $p = \frac{1}{2}$, find $P(X = 2)$. [8 marks]

3. X is a random variable having a normal distribution with mean 64 and variance 43. Find the corresponding x-value for each of the following z-values.
   (a) $z = 7.62$
   (b) $z = 7.17$
   (c) $z = 7.17$ [6 marks]

4. A random variable, X, is normally distributed with a mean of 28 and a standard deviation of 14. Convert each of the following x-values to a z-value.
   (a) $x = 19$
   (b) $x = 40$
   (c) $x = 19$ [6 marks]

5. The height of students in a college has a normal distribution with a mean of 159 cm and a standard deviation of 24 cm. Find
   (a) the height of students in the college which gives a standard score of 0.48,
   (b) the percentage of students in the college with height greater than 147 cm. [10 marks]

6. A random variable, X, has a binomial distribution with $n = 4$ and $p = 0.3$.
   (a) Find the probability distribution of X.
   (b) Hence, plot the graph of the distribution of X. [5 marks]

7. 7 out of 12 boys in a class like to play football. 6 boys are selected at random from the class. Find the probability that
   (a) all the selected students like to play football.
   (b) at least 3 of the selected students like to play football. [5 marks]

8. A random variable, X, is normally distributed with a mean of 39 and a standard deviation of 12. Convert each of the following x-values to a z-value.

(a) $x = 33$
(b) $x = 49$
(c) $x = 31$ [6 marks]

9. X is a random variable having a normal distribution with mean 116 and variance 38. Find the corresponding x-value for each of the following z-values.
(a) $z = -0.32$
(b) $z = -1.62$
(c) $z = -2.27$ [6 marks]

10. X is a random variable having a binomial distribution with n trials and p as the probability of success. Given that
(a) $n = 4$ and $p = 0.4$, find $P(X = 3)$,
(b) $n = 5$ and $p = \frac{1}{5}$, find $P(X = 2)$. [8 marks]

11. X is a random variable having a normal distribution with mean 111 and variance 33. Find the corresponding x-value for each of the following z-values.
(a) $z = -1.91$
(b) $z = 0.52$
(c) $z = -0.17$ [6 marks]

12. The masses of a sample of 80 guava are normal distributed with a mean of 161 g and a standard deviation of 16.129 g.
(a) Determine the probability that a randomly selected guava has a mass greater than 168 g.
(b) A whole seller wishes to purchase 90 guava, each having a mass greater than 172.065 g. Find the number of guava that must be collected in order to achieve the requirement of the whole seller. [10 marks]

13. A test has 20 multiple-choice questions with 4 different choices of answer for each question. There is only one correct answer for each question. Given that the answers to all the questions are guessed, find
(a) the mean number of correct answers obtained,
(b) the variance and the standard deviation of the number of correct answers obtained. [5 marks]

14. Z is a random variable having the standard normal distribution. Evaluate each of the following.
(a) $P(Z > 0.45)$
(b) $P(0.14 < Z < 0.456)$ [5 marks]

15. Z is a random variable having the standard normal distribution. Evaluate each of the following.
(a) $P(Z > 0.459)$
(b) $P(0.13 < Z < 0.459)$ [5 marks]

16. A hot drink machine is regulated so that it dispenses an average of 280 m*l* of hot drink per cup. Assuming that the volume of hot drink in cup is normally distributed with a standard deviation of 10.117 m*l*,
    (a) what is the probability that a cup will contain more than 299 m*l*?
    (b) what is the probability that a cup contains between 261 m*l* and 291.63 m*l*? [10 marks]

17. 7 out of 12 boys in a class like to play football. 6 boys are selected at random from the class. Find the probability that
    (a) all the selected students like to play football.
    (b) at least 3 of the selected students like to play football. [5 marks]

18. Z is a random variable having the standard normal distribution. Evaluate each of the following.
    (a) $P(Z > 0.453)$
    (b) $P(0.1 < Z < 0.456)$ [5 marks]

19. The height of students in a college has a normal distribution with a mean of 179 cm and a standard deviation of 3.75 cm. Find
    (a) the height of students in the college which gives a standard score of 0.5,
    (b) the percentage of students in the college with height greater than 176 cm. [10 marks]

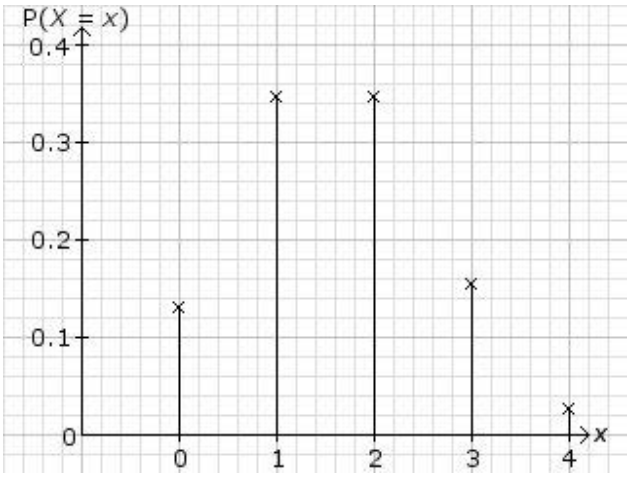
20. A test has 20 multiple-choice questions with 4 different choices of answer for each question. There is only one correct answer for each question. Given that the answers to all the questions are guessed, find
    (a) the mean number of correct answers obtained,
    (b) the variance and the standard deviation of the number of correct answers obtained. [5 marks]

Answers:

1. (a)

x	0	1	2	3	4
$P(X = x)$	0.1296	0.3456	0.3456	0.1536	0.0256

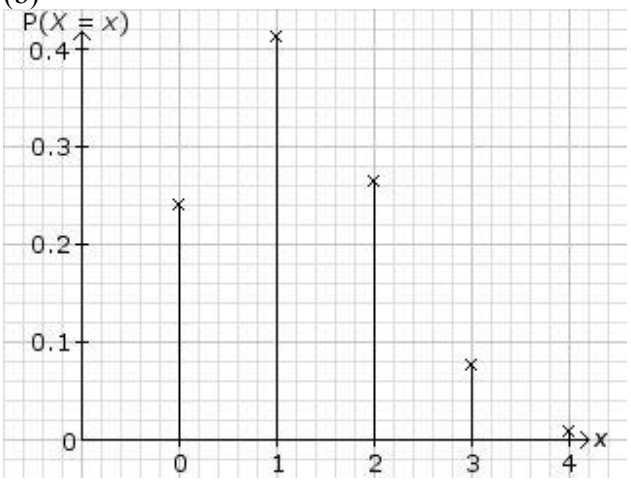
(b)



2. (a) 0.1536
   (b) 0.3125
3. (a) $x = 114$
   (b) $x = 111$
   (c) $x = 111$
4. (a) $z = -0.6$
   (b) $z = 0.9$
   (c) $z = -0.6$
5. (a) 170.52 cm
   (b) 69.1%
6. (a)

x	0	1	2	3	4
$P(X = x)$	0.2401	0.4116	0.2646	0.0756	0.0081

   (b)



7. (a) 0.0394
   (b) 0.797
8. (a) $z = -0.5$
   (b) $z = 0.8$
   (c) $z = -0.7$
9. (a) $x = 114$
   (b) $x = 106$
   (c) $x = 102$
10. (a) 0.1536
    (b) 0.2048
11. (a) $x = 100$
    (b) $x = 114$
    (c) $x = 110$
12. (a) 0.3321
    (b) Number of guava = 365
13. (a) Mean= 5
    (b) Variance= 3.75, Standard deviation= 1.936
14. (a) 0.3264
    (b) 0.1201
15. (a) 0.3231
    (b) 0.1252
16. (a) 0.0302
    (b) 0.8447
17. (a) 0.0394
    (b) 0.797
18. (a) 0.3253
    (b) 0.136
19. (a) 180.88 cm
    (b) 78.8%
20. (a) Mean= 5
    (b) Variance= 3.75, Standard deviation= 1.936