

1. Answer True (T) if the statement is always true, otherwise answer False (F). (10)
- a) A numerical value summarizing all the data of an entire population is called a **parameter** _____
- b) **The 5-Number Summary** divides a set of data into four subsets, with one quarter of the data in each subset _____
- c) In a binomial distribution, $\mu = np$, and $\sigma = \sqrt{npq}$ _____
- d) The **Law of Large Numbers** says that the sampling distribution of sampling means will more closely resemble the Normal distribution as the sample size increases _____
- e) The **Sum of the Squares** of the deviations from the mean will sometimes be negative _____
- f) The **Poisson** distribution is a reasonable approximation to the binomial distribution if $n > 100$ and $np < 10$ _____
- g) If events *A* and *B* are **mutually exclusive**, then $P(A \text{ and } B) = P(A)P(B)$ _____
- h) *A* and *B* are **independent** events if $P(A/B) = P(A)$ _____
- i) **Measures of Central Tendency** measure the spread of a set of data about its mean _____
- j) If *Z* is the **standard normal score**, and $Z = 2.33$, then $P(Z) = 0.49$ _____
2. At a local Couché-Tarde, a randomly selected number of clients were asked how much they had just spent, rounded to the nearest dollar. These are the responses: 7, 5, 3, 5, 1, 9, 7, 13, 7, 6, 6
- a) Rank the data and find the mean, the median, the mode, the range, and the standard deviation. (6)
- b) Give the 5-number summary, and draw a Box and Whisker plot to summarize the data. (5)
3. random sample of 36 orders at a fast food restaurant was taken to analyse the dollar amount of the orders.
The result is as follows: 12 12 33 16 18 25 13 29 15 4 23 23 7 17 19 3 9 27
11 14 5 9 34 7 6 14 5 12 15 11 25 31 25 22 13 4
- a) Make a stem and leaf display of the data. (2)
- b) Organize the data in a frequency table using the class intervals: 1-7, 7-13, 13-19, etc, stopping at 31-37. (5)
- c) Calculate the mean and variance, and the proportion of the data that is within one std. dev. of the mean. (8)
- d) Construct a Histogram and Ogive for these data, You must have proper titles and labeling for the axes. (6)
4. a) George has 4 ties, 6 shirts, and 3 pairs of pants. In how many different ways can he dress ? (1)
- b) In how many different ways can a student choose 3 out of 8 problems to do in an exam ? (1)
- c) A balanced die is rolled. If it shows 1 or an even number, a coin is tossed. Otherwise , the die is rolled again.

- ___ Write the sample space. (2)
- ___ What is the probability that the coin is flipped ? (1)
- ___ What is the probability that a 3 or a 4 shows on the first roll of the die ? (1)
5. A box contains 8 marbles, 1 red, 2 green, and 5 blue. Two marbles are drawn at random in succession.
- a) What is the probability that the first is red and the second is green if the first is replaced before the second is drawn ? (1)
- b) What is the probability that both are blue if the first is not replaced before the second is drawn ? (1)
- c) What is the probability that one is red and the other is blue, without replacement ? (2)
6. The probability that a Science student at a certain college will register in ' Chaucer's English ' in any given semester is 0.03. If there are 200 Science students this semester, what is the probability that only 10 of them will register in this course ? Use the Poisson approximation to the binomial, and say why this approximation is justified. (4)
7. The probability of a West Island resident shopping at a recently opened Big B's supermarket is 0.2. If 12 randomly selected shoppers are stopped and asked where they do their grocery shopping ,
- a) What is the probability that 3 of them shop at Big B's ? (1)
- b) What is the probability that at least two of them shop at Big B's ? (2)
8. For the binomial r.v. x , $p = 0.6$, $x = 0, 1, 2, 3, \dots, 14$.
- a) Using binomial tables, or otherwise, evaluate:
- $\binom{14}{4}(0.6)^4(0.4)^{10} = \underline{\hspace{4cm}}$ $P(3) = \underline{\hspace{4cm}}$ (2)
- b) $P(x \text{ is at most } 2) = \underline{\hspace{4cm}}$ (2)
- c) $\mu = \underline{\hspace{2cm}}$ $\sigma = \underline{\hspace{2cm}}$ (1)
- d) $P(x = 3 \text{ or } 4)$ using the normal approximation to the binomial (3)
9. Three hundred teenagers on the West Island were polled on their opinion about a new sports complex in Pincourt. One hundred and eighty were in favor. Construct a 90 % confidence interval for the true proportion of teenagers on the West Island who are in favor of the new complex. (3)
10. Draw a picture and shade the area which is represented, and evaluate: (4)
- a) $P(1.21 < z < 1.37) = \underline{\hspace{4cm}}$
- b) $P(-0.31 < z < 1.31) = \underline{\hspace{4cm}}$
- c) $P(z > -2.61) = \underline{\hspace{4cm}}$
- d) $z(0.6736) = \underline{\hspace{4cm}}$

11. A sample of size n is taken from a normal population with mean $\mu = 25$ and std. deviation $\sigma = 3.6$. At the 95 % level of confidence, the maximum error of estimate for the mean is 2 % (0.02). Estimate the sample size, n . (2)

12. A sample of size 36 is taken from a population with mean $\mu = 51$ and std. deviation $\sigma = 5.1$.

a) Calculate the corresponding z -scores for x and \bar{x} if (2)

$$x = 48 : \quad z = \underline{\hspace{10cm}}$$

$$\bar{x} = 53 : \quad z = \underline{\hspace{10cm}}$$

b) Calculate $P(48 < x < 53) = \underline{\hspace{10cm}}$ (1)

$$P(48 < \bar{x} < 53) = \underline{\hspace{10cm}}$$
 (1)

13. A hair saloon did a survey of 280 customers regarding satisfaction with service and type of customer. A walk-in customer is one who has seen no ads nor has been referred. The results are displayed below:

	<i>Walk - in</i>	<i>TV Ad</i>	<i>Referred</i>	<i>Total</i>
<i>Not Satisfied</i>	21	9	5	
<i>Satisfied</i>	36	43	59	
<i>Very Satisfied</i>	28	31	48	
<i>Total</i>				

One person is selected at random from this group. What is the probability that she / he (4)

a) is not satisfied ?

b) saw a TV ad and is satisfied ?

c) is very satisfied, given she / he was referred ?

d) is satisfied or saw a TV ad ?

14. Given $P(A) = 0.3$, $P(B) = 0.5$, $P(A \cap B) = 0.15$, (4)

a) $P(A \text{ or } B) = \underline{\hspace{10cm}}$

b) $P(A / B) = \underline{\hspace{10cm}}$

c) $P(\overline{A \cap B}) = \underline{\hspace{10cm}}$

d) Are A and B independent ? Justify your answer.

15. Given the function $f(x) = \frac{x+3}{20}$, $x = -1, 0, 1, 2, 3$. Is it a probability distribution function? Justify (2)

16. For the probability distribution below, find the mean and std. dev. (3)

x	$P(x)$
0	0.1
1	0.1
2	0.2
3	0.4
4	0.1
5	0.1

17. A sample of 60 night school students' ages is obtained in order to estimate their mean age, which is found to be 25.3 years.

a) A point estimate for the population mean μ is _____ (1)

b) If the sample std. dev. is $\sigma = 17.2$, find the 90 % confidence interval for μ . (3)

c) If σ is unknown, but the sample std. dev. is $s = 16$, find the 98 % confidence interval for μ . (3)

NOTE : Ask for answers from your teacher, or get a copy of the answers from the Math Lab (Shiraz Hosein's File)