Unique Science Academy, 60 – D Nawab Town, Lahore

Statistics 12 Monthly Test

(Chapter 10 – Normal Distribution – Objective Type)

29 August 2024 Allowed Time: 50 minutes

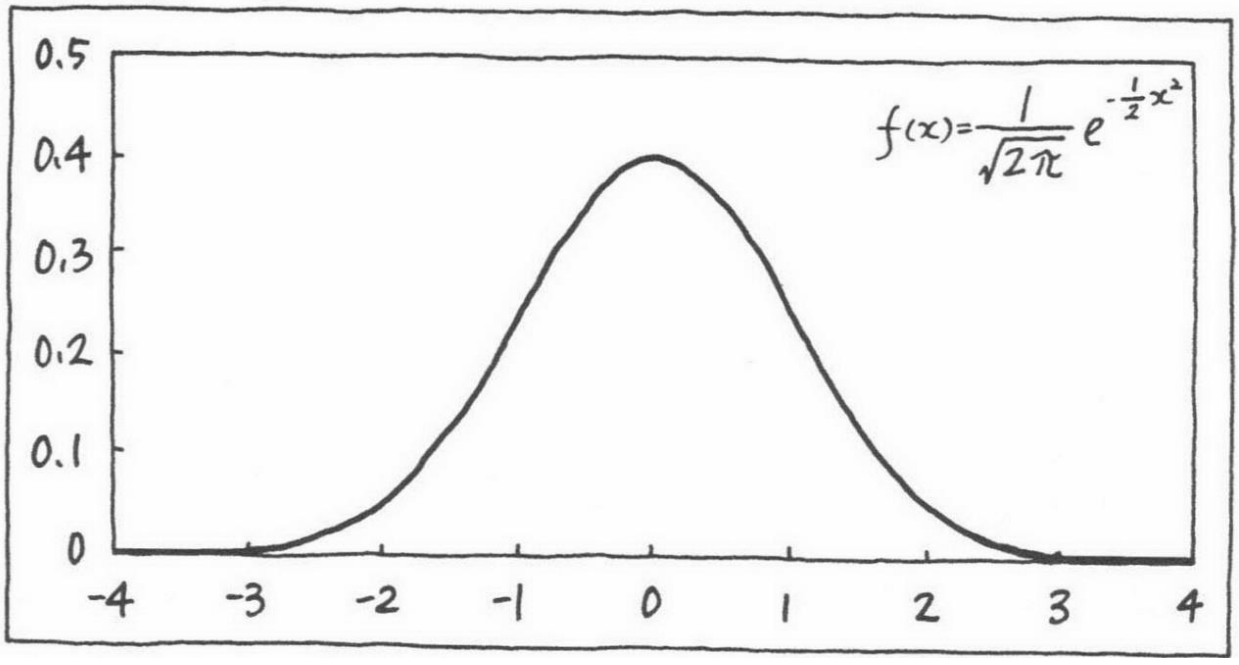
Total Marks: 50

Name _____

1. Select all that are true. **(1 x 40 = 40)**

1. The normal distribution is a _____ that ranges form _____.
   - Discrete probability distribution, $-\infty$ to $+\infty$
   - Continuous probability distribution, 0 to 1.
   - Continuous frequency distribution, -1 to $+1$
   - Continuous probability distribution, $-\infty$ to $+\infty$
2. The value of the parameter σ of a standard normal distribution is always _____.
   - Positive
   - Negative
   - 1
   - Can be positive and negative

3. The normal distribution is a bell shaped _____ distribution.
   - Skew – Symmetrical
   - Symmetrical
   - No skewed
   - Positively and Negatively Skewed
4. If $X \sim N(50,25)$, then $\mu =$ _____ and $\sigma =$ _____
   - 50 and 25
   - 50 and $\sqrt{25}$
   - 0 and 1
   - 50 and 5



5. The maximum ordinate of the standard normal curve is at $Z =$_____
   - μ
   - σ
   - 0.39
   - 0
6. The maximum ordinate of the normal curve is at $X =$ _____
   - Mode
   - μ
   - σ
   - $+\infty$
7. The total area under a normal curve is _____
   - Unity
   - 1
   - 100%
   - ∞
8. The _____ of a normal distribution corresponds to $z = 0$ in the standard normal distribution.
   - Mean
   - Median
   - Mode
   - σ

9. In a normal distribution, the mean, median and mode are _____.
   - Same
   - Identical
   - Equal
   - Can be different
10. In a standard normal distribution, if $P(Z < z_{0,975}) = 0.975$, then $z_{0.975} =$ _____
   - 0.975
   - 0.025
   - 1.96
   - 97.5%
11. In a normal distribution, _____ $= \mu - 0.6745\ \sigma$
   - Q_1
   - $z_{0.25}$
   - $\Phi^{-1}(0.25)$
   - P_{25}
12. In a normal distribution, _____$= \mu + 0.6745\ \sigma$
   - Q_3
   - $z_{0.75}$
   - $\Phi^{-1}(0.75)$
   - P_{75}

13. In a normal distribution, Quartile Deviation ≈ _____ σ

- 0.6745
- $2/3$
- 0.7979
- $4/5$

14. In a normal distribution, Mean Deviation ≈ _____ σ

- $4/5$
- 0.7979
- $\sqrt{2/\pi}$
- 0.6745

15. In a normal distribution, all odd order moments about mean are _____.

- Positive
- Negative
- Zero
- Additive identity of Real Numbers

16. In a normal distribution, $\beta_1 =$ _____ and $\beta_2 =$ _____.

- 0 , 0
- 3 , 0
- 0 , 3
- 3 , 3

17. The normal distribution is _____.

- Platykurtic
- Mesokurtic
- Leptokurtic
- Symmetrical

18. The points of inflexion of a normal curve are _____ from mean.

- Equidistant
- Having different distance
- Skewed
- Zero

19. The limits $\mu \pm \sigma$ include _____ percent area under the normal curve.

- 68.27
- 95.45
- 99.73
- 68.45

20. The limits $\mu \pm 2\sigma$ include _____ percent area under the normal curve.

- 68.27
- 95.45
- 99.73
- 68.45

21. The limits $\mu \pm 3\sigma$ include _____ percent area under the normal curve.

- 68.27
- 99.45
- 99.73
- 68.45

22. The limits $\mu \pm 0.6745\sigma$ include _____ percent area under the normal curve.

- 25
- 50
- 75
- 100

23. Normal distribution has two parameters namely _____ and _____.

- Mean, Standard Deviation
- μ, σ^2
- μ, σ
- Mean, Variance

24. If X is normally distributed with mean μ and variance σ^2, then it is denoted by

- $X \sim N(\mu, \sigma)$
- $X \sim N(0,1)$
- $X \sim N(\mu, \sigma^2)$
- $Z \sim (\mu, \sigma)$

25. The standard normal distribution has mean ____ and variance _____.

- 0, 1
- 1, 0
- μ, σ
- 0, 0

26. Which of the following statement is NOT correct about maximum ordinate of a standard normal curve?

- The maximum ordinate of a standard normal curve is approximately 0.3989
- The maximum ordinal of a standard normal curve is at $Z = \mu$
- The maximum ordinate of a standard normal curve is at $Z = 1$
- The maximum ordinate of a standard normal curve is at $Z = 0$

27. The standard normal distribution is symmetrical about _____.

- $Z = \mu$
- $Z = 0$
- $Z = \mu \pm \sigma$
- $\mu - \sigma < Z < \mu + \sigma$

28. The normal curve has maximum ordinate at

- $X = 0$
- $X = 1$
- $X = \mu$
- $X \to \infty$

29. In a standard normal distribution, if $P(|Z| < a) = 0.95$, then $a =$ _____.

- -1.96
- 1.96
- $\Phi^{-1}(0.95)$
- $2\Phi^{-1}(0.95) - 1$

30. In a standard normal distribution, if $P(Z < z_{0.025}) = 0.025$, then $z_{0.025} =$ _____.

- -1.96
- 1.96
- $\Phi^{-1}(0.025)$
- $1 - \Phi^{-1}(0.95)$

31. In a standard normal distribution, if $P(Z < z_{0.975}) = 0.975$, then $z_{0.975} =$ _____.

- -1.96
- 1.96
- 1.645
- -1.645

32. The normal curve gets closer and closer to the x- axis but never touches it. This property of normal distribution is known as:

- Symmetrical
- Asymmetrical
- Asymptotic
- Invariant

33. The expected value of a normal distribution is

- Mean
- Median
- Mode
- Variance

34. The shape of a normal distribution depends upon _____.

- Ordinates
- Area
- Parameters
- $\sqrt{2\pi}$

35. The second moment about mean of the normal distribution is _____

- σ
- σ^2
- $3\sigma^4$
- μ^2

36. In a normal distribution:

- Mean and variance are always equal
- Variance can be zero.
- $P(\mu - \sigma < X < \mu + \sigma) = P(-1 < Z < +1)$
- $P(\mu - 2\sigma < X < \mu + 2\sigma) = P(-2 < Z < +2)$

37. The parameter σ controls the _____ of the normal curve.

- Location on x- axis
- Relative flatness
- Origin
- Symmetry

38. In a normal distribution, all even moments about mean are ____.

- Zero
- Negative
- Positive
- Same

39. The points of inflexion of the normal curve lie at _____.

- $\mu \pm \sigma$
- $\mu \pm 2\sigma$
- $\mu \pm 3\sigma$
- $\mu^2 \pm 2\sigma^2$

40. Fourth moment about mean in a normal distribution is _____.

- σ^2
- 3
- $3\sigma^4$
- $3\sigma^2$

Mathematical / Theoretical Part

2. Match the correct statements. **(2 x 4 = 8)**

Function Name	Function
Normal Probability Density Function $p.d.f$	$F(x) = P(X \leq x) = P(-\infty < X \leq x)$
Normal Cumulative Distribution Function $c.d.f$	$\varphi(z) = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}}$
Standard Normal Probability Density Function	$\Phi(z) = P(Z \leq z) = P(-\infty < Z \leq z)$
Standard Normal Cumulative Distribution Function	$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$

3. Select all correct options **(1 x 2 = 2)**

a. Which table is used for finding the value $\Phi(1.96)$?

- Ordinates of the Standard Normal Curve at $Z = z$
- Quantiles of the Standard Normal Distribution
- Values of the Normal Cumulative Distribution Function
- Values of the Standard Normal Cumulative Distribution Function

b. Which table is used for finding the value $\Phi^{-1}(0.95)$?

- Ordinates of the Standard Normal Curve at $Z = z$
- Quantiles of the Standard Normal Distribution
- Inverse Standard Normal Cumulative Distribution Function
- Values of the Standard Normal Cumulative Distribution Function