

Multiple Choice Test Bank Questions No Feedback – Chapter 1

Correct answers denoted by an asterisk.

1. The linear relationship between two variables (y and x) can be represented by the equation $y = a + bx$. Which of the following statements is true?

- (I) Parameter a is termed the intercept
 - (II) Parameter a is termed the slope
 - (III) Parameter b is termed the gradient
 - (IV) Parameter b is termed the constant.
- (a) I and IV only
 - (b)* I and III only
 - (c) II and III only
 - (d) II and IV only.

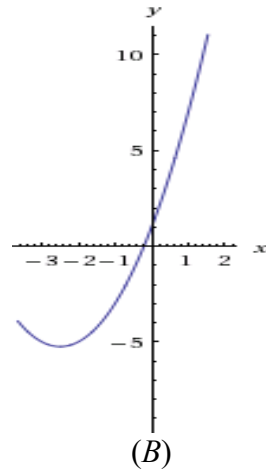
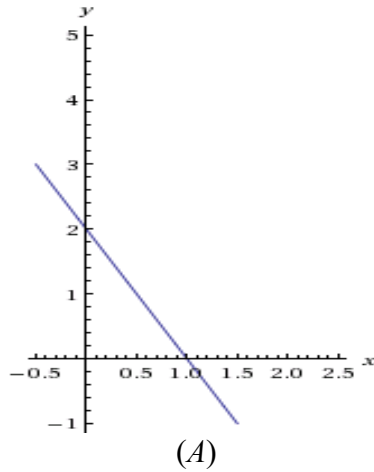
2. Assume that the relationship between a company's stock price (y) and dividends paid per share (x) is linear. If the slope of the equation is 0.50 and the intercept is 30, what would be the expected stock price if the dividend paid was 3?

- (a) 33
- (b) 30.50
- (c)* 31.5
- (d) 30.

3. Which of the following values are closes to the roots of the following quadratic equation: $y = x^2 - 4x + 1$?

- (a) 0 and 4
- (b) 1 and 4
- (c) 0.5 and 3
- (d)* 0.3 and 3.7.

4. Consider the following graphs.



Which of the following statements is true?

- (a) A depicts a non-linear relationship between y and x
- (b) B depicts a linear relationship between y and x
- (c) * A and B depict linear and non-linear relationships between y and x , respectively
- (d) A and B depict non-linear and linear relationships between y and x , respectively.

5. Which of the following statements is true about graph (A) above?

- (a) * The intercept of the graph is positive and its slope is negative
- (b) The intercept of the graph is negative and its slope is positive
- (c) Both the intercept and slope of the graph are positive
- (d) It is impossible to say anything about the intercept and slope without seeing the mathematical equation.

6. The simplest possible way of writing $3x^5 \times 7x^3$ is:

- (a) $21 x^5 \times x^3$
- (b) $21 x^{15}$
- (c) * $21x^8$
- (d) $21x^{53}$.

7. What are the roots of the equation $y = 2x^2 + 2x - 4$?

- (a) * -2 and 1
- (b) -1 and 2
- (c) -2 and 2
- (d) -2 (repeated).

8. What are the roots of the equation $y = x^2 + 2x - 6$ closest to?

- (a) -4 and 2
- (b) -3.65 and 1.65
- (c) -7.3 and 3.3
- (d) Both complex.

9. 'x to the power 3' could be written:

- (a) $3x$
- (b) $3x^3$
- (c) x^3
- (d) $3x \times 3x \times 3x$.

10. Another way of writing $e^{\log(x)}$ is:

- (a) 1
- (b) $\log(x)$
- (c) e^x
- (d) x .

11. $\log(1)$ is:

- (a) 1
- (b) 0
- (c) $2.71828\dots$
- (d) Undefined.

12. Writing out all the terms in the expression $\sum_{i=1}^2 \sum_{j=1}^2 x_{ij}$ would lead to:

- (a) $x_{11} + x_{12} + x_{21} + x_{22}$
- (b) $x_{11} \times x_{12} \times x_{21} \times x_{22}$
- (c) $x_1 + x_2$
- (d) $x_{11} + x_{22}$.

13. $\sum_{i=1}^5 y$ is equal to:

- (a) $5y$
- (b) y
- (c) y^5
- (d) $5y^5$.

14. What is the (first order) derivative of the function $y = x^2 - 4x + 1$?

- (a) $2x - 4x + 1$
- (b) $2x^2 - 4x$
- (c)* $2x - 4$
- (d) $2x - 4 + 1$.

15. What is the second order derivative of the function $y = 6x^4 + 3x^3 + 4x^2 + 2$?

- (a) $24x^3 + 9x^2 + 8x$
- (b)* $72x^2 + 18x + 8$
- (c) $24x^3 + 9x^2 + 8$
- (d) $6x^4 + 3x^3 + 4x^2$.

16. The derivative of $\log(5x)$ is:

- (a) $5/x$
- (b) * $1/x$
- (c) $5\log(x)$
- (d) $5/\log(x)$.

17. The derivative of e^{4x-2} is:

- (a) $4/(4x-2)$
- (b) $(4x-2)e^4$
- (c) $(4x-2)e^{4x-2}$
- (d) * $4e^{4x-2}$.

18. If A is of dimension 1×4 and B is of dimension 4×1 , what is the most accurate term to describe the result of the matrix multiplication AB ?

- (a) * A scalar
- (b) A column vector
- (c) A row vector
- (d) A matrix.

19. If matrices $A = 2 \begin{pmatrix} 3 & 1 \\ 4 & 6 \\ 2 & 2 \end{pmatrix}$ and $B = 4 \begin{pmatrix} 4 \\ 8 \end{pmatrix}$, what is AB ?

- (a)* $\begin{pmatrix} 160 \\ 512 \\ 192 \end{pmatrix}$

(b) $\begin{pmatrix} 20 \\ 64 \\ 24 \end{pmatrix}$

(c) $\begin{pmatrix} 40 \\ 128 \\ 48 \end{pmatrix}$

(d) $\begin{pmatrix} 80 \\ 256 \\ 96 \end{pmatrix}$.

20. The rank of matrices A and B from Question 19 are:

- (a) 1 and 2, respectively
- (b)* 2 and 1, respectively
- (c) 1 and 3, respectively
- (d) 3 and 1, respectively.

21. For two conformable matrices A and B , expanding the parentheses of $(AB)^{-1}$ gives:

- (a) $A^{-1}B^{-1}$
- (b)* $B^{-1}A^{-1}$
- (c) BA
- (d) AB .

22. What is the inverse of matrix $C = \begin{pmatrix} 3 & 1 \\ 4 & 6 \end{pmatrix}$?

(a) $\begin{pmatrix} 0.43 & -0.07 \\ 0.29 & 0.21 \end{pmatrix}$

(b)* $\begin{pmatrix} 0.43 & -0.07 \\ -0.29 & 0.21 \end{pmatrix}$

(c) $\begin{pmatrix} 0.43 & 0.07 \\ 0.29 & 0.21 \end{pmatrix}$

(d) $\begin{pmatrix} -0.43 & 0.07 \\ 0.29 & -0.21 \end{pmatrix}$.

23. The rank of a square matrix is also:

- (a) The product of the eigenvalues
- (b) The sum of the eigenvalues
- (c)* The number of non-zero eigenvalues
- (d) The number of correlated rows or columns.

24. The trace of matrix C is

- (a)* 9
- (b) 8
- (c) 7
- (d) 6.

25. The point where the capital market line is tangential to the efficient frontier is

- (a) The point where the portfolio returns are minimised
- (b) The point where the portfolio returns are maximised
- (c) The point where the portfolio's Sharpe ratio is minimised
- (d)* The point where the portfolio's Sharpe ratio is maximised.

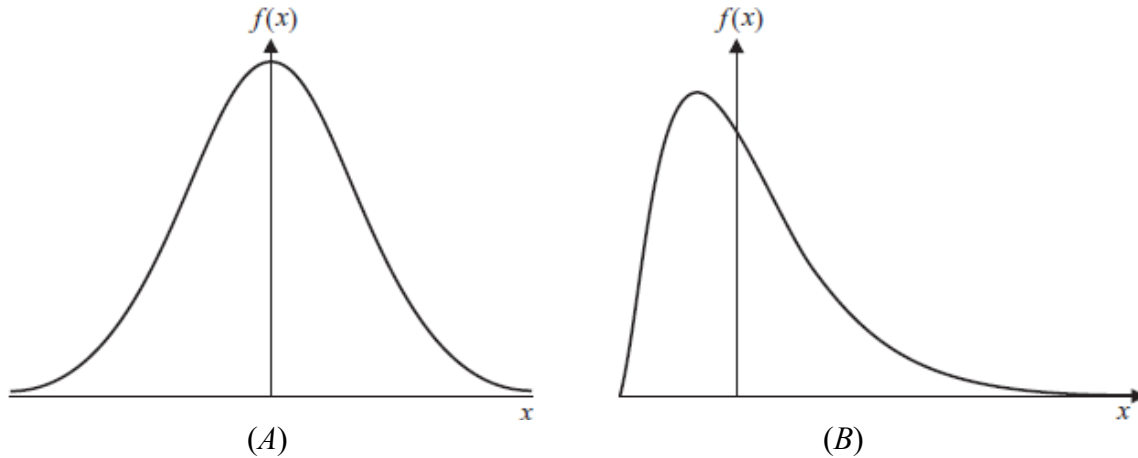
26. The central limit theorem states that

- (a)* The sampling distribution of the mean of any random sample of observations will tend towards the normal distribution with mean equal to the population mean as the sample size tends to infinity
- (b) The sampling distribution of the mean of any random sample of observations will tend towards the normal distribution with mean equal to the population mean as the sample size tends to zero
- (c) The cumulative distribution function of the mean of any random sample of observations will tend towards the normal distribution with mean equal to the population mean as the sample size tends to infinity
- (d) The probability distribution function of the mean of any random sample of observations will tend towards the normal distribution with mean equal to the population mean as the sample size tends to infinity.

27. Consider the following data series: 11, 10, 6, 8, 4, 3, 7. What is its semi-interquartile range of this series?

- (a) 6
- (b) 5
- (c) 4
- (d)* 3.

28. Consider the following two graphs:



Which of the following statements is true if A represents a normal distribution?

- (I) The skewness of the distribution plot A is 0 and its kurtosis is 3
- (II) The skewness of the distribution plot B is 0 and its kurtosis is 3
- (III) The excess kurtosis of the distribution plot A is 3
- (IV) The excess kurtosis of the distribution plot B is 0.

- (a) Both (I) and (III) are true
- (b) Only (III) is true
- (c)* Only (I) is true
- (d) Both (I) and (IV) are true.

29. Suppose that we have a function given by $y = a_1 + a_2x$. a_1 and a_2 are, respectively,

- (a) The domain and range of the function
- (b) The order and power of the function
- (c) * The intercept and slope of the function
- (d) The slope and intercept of the function.

30. What are the roots of the equation $y = 3 + 4x + 2x^2$?

- (a) 2 and -4
- (b) 0.5 and -2
- (c) 2 and 2
- (d) * This function has no real roots.

31. $(x^3)^2$ simplifies to

- (a) x^5
- (b) * x^6
- (c) x
- (d) The expression cannot be simplified.

32. Which of the following three equations is/are correct regarding the summation operator?

- $\frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{x^2}$ (i)
 $\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$ (ii)
 $\frac{d}{dx} \left(\frac{1}{x^3} \right) = -\frac{3}{x^4}$ (iii)

- (a) (iii) only
 (b) * (i) and (iii) only
 (c) (i) and (ii) only
 (d) (i), (ii) and (iii).

33. What is ?

- (a) * 216
 (b) 35
 (c) 6
 (d) 7776.

34. The second order derivative of a quadratic function will be:

- (a) A cubic function
 (b) A quadratic function
 (c) A linear function
 (d) * A constant.

35. Using the chain rule or otherwise, what is the (first) derivative of the following function? $y = (2x^2 + 4x - 6)^3$

- (a) $3(2x^2 + 4x - 6)^2$
 (b) $(4x + 4)^2$
 (c) * $3(2x^2 + 4x - 6)^2(4x + 4)$
 (d) $3(2x^2 + 4x - 6)^3(4x + 4)^2$.