Test Centre : _____

Roll No. : _____

Name of the Candidate : _____

S A U

Entrance Test for MA (Development Economics), 2016

[PROGRAMME CODE : MEC]

Question Paper

Time : 3 hours   Maximum Marks : 100

INSTRUCTIONS FOR CANDIDATES

Candidates must carefully read the following instructions before attempting the Question Paper :

(i) Write your Name, Roll Number and Name of the Test Centre in the space provided for the purpose on the top of this Question Paper and on the OMR Sheet.

(ii) This Question Paper has Three Parts : Part—A, Part—B and Part—C. All parts consist of objective-type questions.

(iii) Part—A has 20 questions of 1 mark each. All questions are compulsory.

(iv) Part—B has 20 questions of 1 mark each. All questions are compulsory.

(v) Part—C has 30 questions of 2 marks each. All questions are compulsory.

(vi) **A wrong answer will lead to the deduction of one-fourth (¼) of the marks assigned to that question.**

(vii) **Please darken the appropriate circle of 'Question Paper Series Code' and 'Programme Code' on the OMR Sheet in the space provided.**

(viii) All questions should be answered on the OMR Sheet.

(ix) Answers written inside the Question Paper will **NOT** be evaluated.

(x) **Calculators and Log Tables may be used. Mobile Phones are NOT allowed.**

(xi) Pages at the end of the Question Paper have been provided for Rough Work.

(xii) **Return the Question Paper and the OMR Sheet** to the Invigilator at the end of the Entrance Test.

(xiii) **DO NOT FOLD THE OMR SHEET.**

/1-A

INSTRUCTIONS FOR MARKING ANSWERS ON THE 'OMR SHEET'
Use BLUE/BLACK Ballpoint Pen Only

1. **Please ensure that you have darkened the appropriate circle of 'Question Paper Series Code' and 'Programme Code' on the OMR Sheet in the space provided.**

   Example :

   Question Paper Series Code
   Write Question Paper Series Code A or B in the box and darken appropriate circle.

   ☐ A or B

   ● Ⓐ

   Ⓑ

   Programme Code
   Write Programme Code in the box and darken the appropriate circle.

   Write Programme Code ☐

MEC	●	MAM	○	PCS	○
MSO	○	MLS	○	PBT	○
MIR	○	PEC	○	PAM	○
MCS	○	PSO	○	PLS	○
MBT	○	PIR	○		

2. Use only Blue/Black Ballpoint Pen to darken the Circle. Do not use Pencil to darken the Circle for Final Answer.

3. Please darken the whole Circle. ●

4. Darken <u>ONLY ONE CIRCLE</u> for each question as shown below in the example :

   Example :

Wrong	Wrong	Wrong	Wrong	Correct
● ⓑ ⓒ ●	ⓐ̸ ⓑ ⓒ ⓓ	ⓐ̸ ⓑ ⓒ ⓓ̸	⊙ ⓑ ⓒ ●	ⓐ ⓑ ⓒ ●

5. Once marked, no change in the answer is allowed.

6. Please do not make any stray marks on the OMR Sheet.

7. Please do not do any rough work on the OMR Sheet.

8. Mark your answer only in the appropriate circle against the number corresponding to the question.

9. **A wrong answer will lead to the deduction of one-fourth (¼) of the marks assigned to that question.**

10. Write your six-digit Roll Number in the small boxes provided for the purpose; and also darken appropriate circle corresponding to respective digits of your Roll Number as shown in the example below.

    Example :

    ROLL NUMBER

1	3	5	7	2	0
●	①	①	①	①	①
②	②	②	②	●	②
③	●	③	③	③	③
④	④	④	④	④	④
⑤	⑤	●	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	●	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨
⓪	⓪	⓪	⓪	⓪	●

PART—A

1. The matrix $A = \begin{bmatrix} 9 & 0 \\ 0 & 9 \end{bmatrix}$ is a/an

   (a) scalar matrix

   (b) identity matrix

   (c) even matrix

   (d) odd matrix

2. The tangent line to the graph of $f(x) = |x|$ at $x = 0$ is

   (a) 0

   (b) 1

   (c) –1

   (d) Does not exists

3. What is the value of a, if $f(x) = \begin{cases} ax^2 - 2 & \text{if } x < 2 \\ 6 & \text{if } x \geq 2 \end{cases}$ is continuous at $x = 2$?

   (a) –2

   (b) 2

   (c) –3

   (d) 3

4. The interval of the inequality $-4 \leq 3x - 6 < 9$ is given by

   (a) $\left[-\frac{2}{3}, 5 \right]$

   (b) $\left[\frac{2}{3}, 5 \right]$

   (c) $\left[-\frac{2}{3}, 5 \right)$

   (d) $\left[\frac{2}{3}, 5 \right)$

5. If $f(x) = 2x$ and $g(x) = -x^3$, then $f \circ g(-2) =$

   (a) 8

   (b) –8

   (c) 16

   (d) –16

6. If $f(x) = |x| + x^2$, then $f'(-1) =$

(a) -3

(b) -1

(c) 1

(d) 3

7. If $a > 0$, then a minimum for $ax^2 + bx + c$ would be

(a) $-\dfrac{b}{2a}$

(b) $c - \dfrac{b^2}{4a}$

(c) $-\dfrac{b}{4a}$

(d) $-\dfrac{b}{4ac}$

8. $f'(a)$ is the slope of the tangent to the curve $y = f(x)$ at the point

(a) (a, x)

(b) $(a, f(a))$

(c) $(x, f(a))$

(d) $(x, f(x))$

9. If $x\sqrt{f(x)} = 2$, then $f'(x)$ is

(a) $\dfrac{f(x)}{x}$

(b) $\dfrac{2f(x)}{x}$

(c) $-\dfrac{2f(x)}{x}$

(d) $-\dfrac{f(x)}{x}$

10. For a linear function f that is differentiable at x, the elasticity of f with respect to x is

(a) $\dfrac{f(x)}{x} f'(x)$

(b) $\dfrac{x}{f(x)} f'(x)$

(c) $\dfrac{f'(x)}{xf(x)}$

(d) $\dfrac{f(x)}{xf'(x)}$

11. $\lim\limits_{x \to 0^+} \dfrac{x + |x|}{x}$ is

(a) 0

(b) 1

(c) 2

(d) $\frac{1}{2}$

12. For which value of a the function $f(x) = \begin{cases} ax - 1, & \text{for all } x \leq 1 \\ 3x^2 + 1, & \text{for all } x > 1 \end{cases}$ is continuous for all x?

(a) 2

(b) 3

(c) 4

(d) 5

13. The derivative of the function $f(x) = \ln\sqrt{(1 - x^2)}$ is

(a) $-\dfrac{x}{1 - x^2}$

(b) $\dfrac{x}{1 - x^2}$

(c) $\dfrac{x}{1 + x^2}$

(d) $-\dfrac{x}{1 + x^2}$

14. What is the value of a, if $B = \begin{bmatrix} 1 & 4 \\ 2 & a \end{bmatrix}$ is a singular matrix?

    (a) 5

    (b) 6

    (c) 7

    (d) 8

15. If A and B are matrices, then which one from the following is not always true?

    (a) $A + B = B + A$

    (b) $(A^t)^t = A$

    (c) $AB = BA$

    (d) All of the above are true

16. For matrices A and B, which one of the following properties is not always true?

    (a) $|A^2| = |A|^2$

    (b) $|A + B| = |A| + |B|$

    (c) $|A^T| = |A|$

    (d) $|2A * 4B| = 2^6|A||B|$

17. If $A = \begin{bmatrix} 5 & 3 & 2 \\ 0 & 4 & 1 \\ 0 & 0 & 3 \end{bmatrix}$, then $|A| =$

    (a) 30

    (b) 40

    (c) 50

    (d) 60

18. Find the values of a and b, if $A = \begin{bmatrix} 1 & -1 \\ a & b \end{bmatrix}$ and $A^2 = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$.

(a) $a = 1$ and $b = 2$

(b) $a = -1$ and $b = -2$

(c) $a = 1$ and $b = 4$

(d) $a = -1$ and $b = -4$

19. The Euclidean distance between the points $(2, 3, 4, 5)$ and $(-2, 4, 1, -5)$ is

(a) $\sqrt{126}$

(b) $\sqrt{187}$

(c) $\sqrt{152}$

(d) 15

20. If a matrix A is 5×3 and the product AB is 5×7, what is the size of B?

(a) 3×7

(b) 4×3

(c) 7×3

(d) 3×4

PART—B

21. Every time Mr X eats a samosa, he adds 25 paise worth of tomato sauce on top. Tomato sauce on samosa is a part of Mr X's

   (a) total fixed cost and total cost alone

   (b) total variable cost alone

   (c) marginal cost alone

   (d) total variable cost, marginal cost and total cost

22. A consumer's utility function is given by $U = 3x + y$ for two goods x and y. Per unit price of x and y are ₹30 each. The total income of the consumer is ₹900. The equilibrium consumption bundle (x, y) of the consumer is

   (a) (30, 0)

   (b) (0, 30)

   (c) (15, 15)

   (d) None of the above

23. For Mr X, the potato is an inferior good. This means that

   (a) when the price of potato decreases, his consumption of potato increases

   (b) when Mr X's income decreases, his consumption of potato increases

   (c) when the price of potato falls, his consumption of potato increases

   (d) Both (b) and (c) are true

24. Consider a production function $Q(K, L) = K.L + 10$, where Q is the output, and K and L are the two inputs in the production process. This production function is

   (a) homogenous but not homothetic

   (b) homothetic but not homogenous

   (c) both homogenous and homothetic

   (d) neither homogenous nor homothetic

25. The idea of Gross National Happiness (GNH) has originated from

    (a)   Nepal

    (b)   Sri Lanka

    (c)   India

    (d)   Bhutan

26. Currently which country in the SAARC region has the highest per capita income?

    (a)   India

    (b)   Sri Lanka

    (c)   Maldives

    (d)   Bhutan

27. In the two-gap analysis of foreign aid, a country with a binding savings gap needs which of the following strategies to bolster economic growth?

    (a)   Attract foreign aid

    (b)   Decrease imports

    (c)   Increase productive resources

    (d)   None of the above

28. In the stylized facts highlighted by Simon Kuznets, during the structural change of an economy with growth, which of the following is not true?

    (a)   The proportion of GDP in agriculture falls

    (b)   The proportion of labour force outside agriculture falls

    (c)   The industrial GDP goes up

    (d)   The agricultural GDP goes up

29. Failure of the permanent income hypothesis implies that

(a) Random-walk hypothesis does not hold

(b) Ricardian equivalence holds

(c) Both (a) and (b) are true

(d) None of the above

30. If the prices are rigid in the short run and flexible in the long run, a tight monetary policy would then lead to

(a) higher nominal interest rates in the short run and lower nominal interest rates in the long run

(b) lower nominal interest rates in the short run and higher nominal interest rates in the long run

(c) lower nominal interest rates in both short run and long run

(d) higher nominal interest rates in both short run and long run

31. Over the long run, the rate of depreciation of the nominal exchange rate between two countries is approximately equal to the difference in

(a) real output growth rates

(b) real interest rates

(c) productivity growth rates

(d) inflation rates

32. There are theoretical reasons to expect that changes in wealth are responsible for change in consumption. However, empirical data shows a strong link between current disposable income and consumption. One reason why this might happen is

(a) credit rationing by lenders

(b) attempts by households to smoothen their consumption

(c) household savings providing a buffer between income and consumption

(d) Ricardian equivalence

33. Which one of the following statements is true?

(a) If there is no intercept in the regression model, the estimated errors ordinary least squares will still sum to zero

(b) The p value and the size of a test statistic mean the same thing

(c) The conditional and unconditional means of a random variable are the same thing

(d) None of the above

34. Suppose that each of two die is loaded so that when either die is rolled, the probability that the number k will appear is 0·1 for k = 1, 2, 5 or 6 and is 0·3 for k = 3 or 4. If the two loaded die are rolled independently, what is the probability that the sum of the two numbers that appear will be 7?

(a) 0·27

(b) 0·22

(c) 0·33

(d) 0·43

35. If X_1, X_2 and X_3 are uncorrelated variables each having the same standard deviation, show that the coefficient of correlation between $X_1 + X_2$ and $X_2 + X_3$ is equal to

(a) 0

(b) 1

(c) $\frac{1}{2}$

(d) $\frac{3}{4}$

36. Suppose that a fair coin is tossed independently n times. The probability of obtaining exactly $n - 1$ heads, given that at least $n - 2$ heads are obtained is

(a) $\dfrac{n-1}{\binom{2n}{n}}$

(b) $\dfrac{2n}{4n^2 + 1}$

(c) $\dfrac{n}{n^2 + 2}$

(d) $\dfrac{2n}{n^2 + n + 2}$

37. Assume that B is a 3×3 matrix with the property that $B^2 = B$. Which one of the following statements about the matrix B must be true?

(a) B is invertible

(b) $\det(B) = 0$

(c) $\det(B^5) = \det(B)$

(d)   None of the above

38. If $A = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 0 & -1 \\ 3 & 4 & 5 \end{pmatrix}$, which one of the following statements is correct?

(a) A is invertible since $\det A = 0$

(b) A is not invertible since $\det A = 0$

(c) A is invertible since $\det A \neq 0$

(d) A is not invertible since $\det A \neq 0$

39. Let A and B be square matrices of order 3. If $|A| = 3$ and $|B| = -1$, then $|2A * 4B| =$

(a) $-4(2^3)$

(b) $-3(2^3)$

(c) $-3(2^9)$

(d) $-2(2^3)$

40. Compute the product $(-6 \quad 2 \quad 5) \begin{pmatrix} 6 \\ 0 \\ -3 \end{pmatrix}$.

(a) (-51)

(b) $\begin{pmatrix} -36 \\ 0 \\ -15 \end{pmatrix}$

(c) (174)

(d) $(-36 \quad 0 \quad -15)$

PART—C

41. Mr X's total wealth next year, including his factory, is estimated to be ₹ 6,00,000. There is a 20 percent chance that an accident in the factory, valued at ₹ 3,00,000, will completely ruin it next year. Mr X's expected wealth next year, if he does not purchase hazard insurance for his factory is

   (a) ₹ 6,00,000

   (b) ₹ 5,20,000

   (c) ₹ 5,40,000

   (d) None of the above

42. Consider a competitive industry where the market demand is given by $P = 50 - Q$. The marginal cost function is simply $MC = Q$. If the government imposes a tax of ₹ 10 per unit of production of this good, the equilibrium market price will go up by

   (a) zero

   (b) ₹ 10

   (c) ₹ 20

   (d) ₹ 5

43. The production function of a monopolist firm is given by $Q = 10L - 0·5L^2$, where L is labour input and Q is output. Suppose that the demand curve is $P(Q) = 50 - 0·5Q$. What is the marginal revenue product of labour curve?

   (a) $500 + 150L - 15L^2$

   (b) $500 - 150L + 15L^2 - 0·5L^3$

   (c) $50 - Q$

   (d) None of the above

44. Two kinds of consumers exist for product Z in a market—one kind of consumer has an intense liking for the product, with an inverse demand curve of $P = 20 - Q$, where P is the price of Z and Q is the quantity of Z. The other type of consumer has a less intense liking for the product and has an inverse demand $P = 5 - (\frac{1}{2}) * Q$. Suppose that there are only two consumers in the market, one of each type. The market demand curve for Z is

   (a) $Q = p$ for all price levels p

   (b) $Q = 30 - 3P$ for all price levels $p > 5$ and $Q = 20 - P$ for $p \le 5$

   (c) $Q = 15 - 3P$ for all price levels $p \le 5$ and $Q = 20 - P$ for $p > 5$

   (d) $Q = 30 - 3P$ for all price levels $p \le 5$ and $Q = 20 - P$ for $p > 5$

45. Consider an environment where an individual faces $(p_1, p_2) = (1, 1)$. At these prices, she is maximizing her utility at $(x_1, x_2) = (7, 7)$. If the prices change to $(1, 2)$, the consumer is

(a) as well off as before

(b) worse off

(c) better off if she was a net buyer of good-1 and remained a net buyer after the price change

(d) None of the above

46. Company X's production function is $Q = K^{0.5}L^{0.5}$, where Q is output produced. Cost of capital is ₹ 3 and cost of labour is ₹ 6. Company X is currently producing output with 45 units of labour (L) and 450 units of capital (K). Is company X producing efficiently?

(a) Yes

(b) No

(c) Indeterminate

(d) Additional information is needed to decide on the correct answer

47. Suppose a rural worker in Sri Lanka is considering migrating to the city. She is currently earning a daily wage of 20 Sri Lankan rupees and has come to know that the average daily wage in the city is 30 Sri Lankan rupees. According to the tenets of the Harris-Todaro model, she will

(a) stay back in the rural sector as the wage differential is not substantial

(b) migrate to the city as the wage there is higher than her current wage

(c) take the decision based on the probability of finding a job at the going wage rate in the city

(d) decide to divide her labour time between the rural and the urban sectors

48. The official unemployment rate in the rich countries tends to be significantly higher than that in the poorer countries. This phenomenon is explained by

(a) the downward rigidity of wages in the rich countries

(b) higher efficiency of labour market in poorer countries

(c) the presence of widespread social safety nets in the rich countries

(d) Both (a) and (c)

Next **FOUR** questions (49–52) are based on the following paragraphs :

"Mutual trust created through personal interactions in a community comprises a social capital useful for community members alone. In that sense, such trust is a kind of 'local public good' whose benefit is limited to a particular group.

Generally speaking, the comparative advantage of community over the market and the State lies in the supply of local public goods (compared with the market's supply of private goods and the State's supply of 'global public goods'), because the community relationship is effective in preventing free-riders. When residents in one village have agreed to undertake collective work on construction of a country road, a villager's private benefit can be maximized if he becomes a free-rider, i.e., if he utilizes the road built by other villagers' work, while not contributing his own labour to the project in violation of the village community's agreement. How close to a social optimum level the supply of local public goods would increase depends, to a large extent, on how strong the trust forged among people in the community and, hence, how severe the social sanction would be against a violator of the community's agreement.

Local public goods can be supplied by the command of government also. However, in the process of raising necessary tax revenue and allocating it among alternative uses and areas, significant administrative as well as political lobbying costs are inevitably entailed. Also, governments are usually short of the capacity to accurately grasp the structure of demands for public goods at the grassroots. ...

However, communities with scant accumulation of trust capital have no comparative advantage in the supply of local public goods and, hence, must rely on government for its supply even if its absolute cost is high."

[From *Development Economics : From the Poverty to the Wealth of Nations* by Yujiro Hayami and Yoshihisa Godo, p. 316, New Delhi : Oxford University Press, 3rd. edn., 2005.]

49. Community-led provisioning of public goods may not be equitable when

(a) the community has accumulated 'trust capital' but has limited access to resources

(b) the community is fractured along economic and social dimensions

(c) even though the community has accumulated 'trust capital', it produces for the market

(d) All of the above

50. According to the extract quoted above, which one of the following statements is true?

(a) Only a community can efficiently supply local public goods

(b) A well-functioning market can supply local public goods more efficiently than the State

(c) The nature of a local public good will determine which institution can supply it more efficiently

(d) Only the State can supply local public goods in the absence of social capital

51. In the passage above, the social capital of a community increases if

(a) the community is wealthy

(b) the community has collective ownership of productive resources

(c) a higher proportion of the members of a community belong to a privileged social group

(d) None of the above

52. The State does not have a comparative advantage in providing local public goods because

(a) the State lacks accountability to the community

(b) the State lacks funds

(c) the State's decision-making, execution and access to information is imperfect

(d) the community does not trust the State

53. Suppose the production function takes the form

$$Y(t) = K(t)^{\alpha}[A(t)L(t)]^{1-\alpha} \quad 0 < \alpha < 1$$

where K is capital stock and AL is effective labour. Parameters used in the models are s, n, δ, g and α which represent the savings rate, population growth rate, depreciation rate of capital, growth rate of technology and share of capital in output respectively. Given all the assumptions of the Solow model, the steady-state values of capital per unit of effective labour (k) will be

(a) $[s/(n+g+\delta)]^{1/(1-\alpha)}$

(b) $sk^{\alpha} - (n+g+\delta)k$

(c) $(s)^{1/(1-\alpha)}$

(d) None of the above

54. Suppose the total income in an economy is given by $Y = C + I + G + NX$, where $C = a + b(1-t)Y$. If $G = \$1200$ billion, $I = \$900$ billion, $NX = -\$100$ billion, $b = 0.9$, $a = \$220$ billion and t(tax rate) $= 0.3$, how much does the economy earn as tax revenue?

(a) $ 6000 billion

(b) $ 4000 billion

(c) $ 1800 billion

(d) $ 600 billion

55. Suppose in a competitive goods' market, output is produced by using only labour such that $Y = f(L)$ ... ... (1). The wage paid to labour is equivalent to last year's price of Y, i.e., $W = aP_{t-1}$ ... ... (2), where $a > 0$. Since the goods market is competitive, employment is determined at the point where marginal product of labour is equal to real wage, i.e., when $F'(L) = W/P$ ... ... (3). Substituting (2) in (3), we have $F'(L) = aP_{t-1}/P$ which after some manipulation gives $F'(L) = a/1 + \pi$ ... ... (4), where π is inflation rate. The relation (4) implies

(a) a permanent unemployment-inflation trade-off

(b) no trade-off between unemployment and inflation

(c) the unemployment-inflation trade-off exists only in the short run

(d) nothing can be said about the relation between employment and inflation rate

56. The inverse relationship between interest rates and bond prices is due to which one of the following fact?

(a) Market makers require a bid-ask spread to offer their services at all

(b) Maturity premiums increase with the term of a bond

(c) A bond price represents the present discounted value of the payments agreed upon at the time when the bond was issued

(d) Capital markets are not efficient for long-maturity loans

57. Suppose the following bilateral spot exchange rates are being quoted for the Afghan Afghani (AFN), Bangladeshi Taka (BDT) and Maldivian Rufiyaa (MVR) :

BDT/MVR = 5·26
AFN/MVR = 4·54
AFN/BDT = 0·88

If you start with 100 MVR, the most you could end up with (in MVR) in a single round of trilateral arbitrage would be

(a) 93·33

(b) 98·08

(c) 101·96

(d) 102·67

58. Phillips curve, representing an inverse relationship between unemployment and inflation, could be seen in several studies for a period of about hundred years. However, this simple relationship broke down once policymakers started systematically using this relationship to address unemployment, because

(a) policymakers lacked information about the exact nature of the relationship between unemployment and inflation

(b) forward-looking agents started pre-empting the actions of policymaker and incorporating them in their decision-making

(c) the rate of interests were too low, leading to a reduction in savings

(d) there was lack of demand in the economy

59. If r, the coefficient of correlation between n pairs of values (X_i, Y_i) is positive, then which one of the following statements is true?

(a) r between $(-X_i, -Y_i)$ is negative

(b) r between $(-X_i, Y_i)$ and that between $(X_i, -Y_i)$ can be either positive or negative

(c) Both the slope coefficients β_{yx} and β_{xy} are positive, where β_{yx} = slope coefficient in the regression of Y on X and β_{xy} = slope coefficient in the regression of X on Y

(d) None of the above

60. Consider a simple linear regression model. Suppose you multiply all the dependent variable values by 2, what will be the effect of this rescaling, if any, on the standard error of the coefficient of X?

(a) No effect

(b) The new standard error will be twice the original standard error

(c) The new standard error will be four times the original standard error

(d) The new standard error will be half the original standard error

61. Suppose that a random variable X has a continuous distribution with the following probability function :

$$f(x) = \begin{cases} ce^{-2x} & \text{for} \quad x > 0 \\ 0 & \text{otherwise} \end{cases}$$

The probability of the event $X + 2 = e^{-2}$ is

(a) e^{-2}

(b) $e^{-2} - e^{-4}$

(c) $e^{-4} - e^{-2}$

(d) 0

62. Suppose that the random variable X has mean μ and variance σ^2, and that $Y = aX + b$. The values of a and b for which $E(Y) = 0$ and $\text{var}(Y) = 1$ are

(a) $-1/\sigma^2$ and $-a\mu$

(b) $1/\sigma^2$ and $-a\mu$

(c) Both (a) and (b)

(d) $1/\sigma^2$ and $a\mu$

63. Which one of the following can cause the usual OLS t-statistics to be invalid (that is, not to have t distributions under H_0)?

(a) Heteroscedasticity

(b) A sample correlation coefficient of ·95 between two independent variables that are in the model

(c) Omitting an important explanatory variable

(d) All of the above

64. If a random variable X has a cumulative distribution function $F(x)$, which one of the following statements will be true?

(a) $F(x)$ is continuous in x

(b) $F(x)$ is strictly increasing in x

(c) $F(x)$ takes values in the $[0, 1]$ interval

(d) All of the above

65. Consider the following matrix :

$$A = \begin{pmatrix} 1 & -1 & 0 & 0 \\ 2 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -1 & 1 & 0 & 1 \end{pmatrix}$$

Which one of the following statements is true?

(a) The columns are linearly dependent

(b) The matrix has determinant -1

(c) The matrix is not invertible

(d) None of the above

66. The columns of any 4×5 matrix are linearly dependent. This statement is

(a) true

(b) false

(c) depends on the set of vectors one is looking at

(d) None of the above

67. For which values of h are the given vectors linearly independent?

$$\begin{pmatrix} 1 \\ -6 \\ 1 \end{pmatrix}, \begin{pmatrix} -4 \\ 24 \\ h \end{pmatrix}$$

(a) Vectors are linearly independent for $h = -4$

(b) Vectors are linearly dependent for all h

(c) Vectors are linearly independent for all h

(d) Vectors are linearly independent for $h \ne -4$

68. If the leading principal minors of a 4×4 matrix are $|A_1| = -1$, $|A_2| = 1$, $|A_3| = -2$ and $|A_4| = |A| = 0$, then

(a) the matrix is negative semidefinite

(b) its definiteness cannot be determined from this information

(c) the matrix is indefinite

(d) the matrix is positive definite

69. If A and B are symmetric matrices, then which of the following will always be a symmetric matrix?

(a) BA

(b) $A + B$

(c) AB

(d) All of the above

70. If A is a matrix such that $A^2 = A$ and if $B = A - I$, then

(a) $B^2 = B$

(b) $B^2 = I$

(c) $B^2 = -B$

(d) None of the above