MATHS

BOOKS - KCET PREVIOUS YEAR PAPERS

KARNATAKA CET 2014

Mathematics

1. Which one of the following is not correct for the features of exponential function given by $f(x) = b^x$ where $b > 1$?

A. For very large negative values of x, the function is very close to 0.

B. The domain of the function is R, the set of real numbers.

C. The point (1, 0) is always on the graph of the function.

D. The range of the function is the set of all positive real numbers.

Answer: C

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2. If $y = (1+x)\left(1+x^2\right)\left(1+x^4\right)$, then $\frac{dy}{dx}$ at $x = 1$ is

A. 20

B. 28

C. 1

D. 0

Answer: B

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3. If $y = \left(\tan^{-1} x\right)^2$ then show that $\left(x^2+1\right)^2 \frac{d^2y}{dx^2} + 2x\left(x^2+1\right)\frac{dy}{dx} = 2$

A. 4

B. 0

C. 2

D. 1

Answer: C

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4. If $f(x) = x^3$ and $g(x) = x^3 - 4x$ in $-2 \leq x \leq 2$, then consider the statements :

(i) $f(x)$ and $g(x)$ satisfy Rolle's theorem.

(ii) $f(x)$ and $g(x)$ both satisfy Rolle's theorem.

(iii) Only $g(x)$ satisfies Rolle's theorem. Of these statements

A. (i) and (ii) are correct

B. (i) alone is correct

C. None is correct

D. (i) and (iii) are correct

Answer: D

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5. Which of the following is not a correct statement ?

A. Mathematics is interesting.

B. $\sqrt{3}$ is a prime.

C. $\sqrt{2}$ is irrational.

D. The sun is star.

Answer: B

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6. If the function $f(x)$ satisfies $\lim_{x \to 1} \frac{f(x) - 2}{x^2 - 1} = \pi$, then $\lim_{x \to 1} f(x) =$

A. 1

B. 2

C. 0

D. 3

Answer: B

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7. The tangent to the curve $y = x^3 + 1$ at(1, 2) makes an angle θ with y-axis, then the value of tan θ is

A. $-\frac{1}{3}$

B. 3

C. -3

D. $\frac{1}{3}$

Answer: D

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8. If the function $f(x)$ defined by

$f(x) = \frac{x^{100}}{100} + \frac{x^{99}}{99} + \ldots . + \frac{x^2}{2} + x + 1$, then $f'(0) =$

A. $100f'(0)$

B. 100

C. 1

D. -1

Answer: C

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9. If $f(x) = f(\pi + e - x)$ and $\int_e^{\pi} f(x)dx = \frac{2}{e+\pi}$, then $\int_e^{\pi} xf(x)dx$ is equal to

A. $\pi - e$

B. $\frac{\pi + e}{2}$

C. 1

D. $\frac{\pi - e}{2}$

Answer: C

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10. If linear function $f(x)$ and $g(x)$ satisfy $\int[(3x-1)\cos x + (1-2x)\sin x]dx = f(x)\cos x + g(x)\sin x + C$, then

A. $f(x) = 3(x-1)$

B. $f(x) = 3x - 5$

C. $g(x) = 3(x-1)$

D. $g(x) = 3 + x$

Answer: C

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11. The value of the integral

$\int_{-\pi/4}^{\pi/4} \log(\sec\theta - \tan\theta)d\theta$ is

A. 0

B. $\frac{\pi}{4}$

C. π

D. $\frac{\pi}{2}$

Answer: A

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12. $\int \frac{\sin 2x}{\sin^2 x + 2\cos^2 x} dx =$

A. $-\log\left(1+\sin^2 x\right) + C$

B. $\log\left(1+\cos^2 x\right) + C$

C. $-\log\left(1+\cos^2 x\right) + C$

D. $\log\left(1+\tan^2 x\right) + C$

Answer: C

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13. Let S be the set of all real numbers. A relation R has been defined on S by a Rb $\Rightarrow |a-b| \leq 1$, then R is

A. symmetric and transitive but not reflexive

B. reflexive and transitive but not symmetric

C. reflexive and symmetric but not transitive

D. an equivalence relation

Answer: C

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14. For any two real numbers, an operation $*$ defined by $a * b = 1 + ab$ is

A. neither commutative nor associative

B. commutative but not associative

C. both commutative and associative

D. associative but not commutative.

Answer: B

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15. Let $f: N \to N$ defined by

$$f(n) = \begin{cases} \frac{n+1}{2} & \text{if n is odd} \\ \frac{n}{2} & \text{if n is even} \end{cases}$$ then f is

A. onto but not one-one

B. one-one and onto

C. neither one-one nor onto

D. one-one but not onto

Answer: A

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16. Suppose $f(x) = (x+1)^2$ for $x \geq -1$. If $g(x)$ is a function whose graph is the reflection of the graph of $f(x)$ in the line $y = x$, then $g(x) =$

A. $\frac{1}{(x+1)^2}, x > -1$

B. $-\sqrt{x} - 1$

C. $\sqrt{x} + 1$

D. $\sqrt{x} - 1$

Answer: D

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17. The domain of the function $f(x) = \sqrt{\cos x}$ is

A. $\left[\frac{3x}{2}, 2\pi\right]$

B. $\left[0, \frac{\pi}{2}\right]$

C. $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$

D. $\left[0, \frac{\pi}{2}\right] \cup \left[\frac{3x}{2}, 2\pi\right]$

Answer: D

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18. In a class of 60 students, 25 students play cricket and 20 students play tennis and 10 students play both the games, then the number of students who play neither is

A. 45

B. 0

C. 25

D. 35

Answer: C

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19. Given $0 \leq x \leq \frac{1}{2}$ then the value of $\tan\left[\sin^{-1}\left\{\frac{x}{\sqrt{2}} + \frac{\sqrt{1-x^2}}{\sqrt{2}}\right\} - \sin^{-1} x\right]$ is

A. 1

B. $\sqrt{3}$

C. -1

D. $\frac{1}{\sqrt{3}}$

Answer: A

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20. The value of $\sin\left(2\sin^{-1}0.8\right)$ is equal to

A. 0.48

B. $\sin 1.2^\circ$

C. $\sin 1.6^\circ$

D. 0.96

Answer: D

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21. If A is 3×4 matrix and B is a matrix such that A'B and BA' are both defined, then B is of the type

A. 4×4

B. 3×4

C. 4×3

D. 3×3

Answer: B

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22. The symmetric part of the matrix

$$A = \begin{bmatrix} 1 & 2 & 4 \\ 6 & 8 & 2 \\ 2 & -2 & 7 \end{bmatrix} \text{ is}$$

A. $\begin{bmatrix} 0 & -2 & -1 \\ -2 & 0 & -2 \\ -1 & -2 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 4 & 3 \\ 2 & 8 & 0 \\ 3 & 0 & 7 \end{bmatrix}$

C. $\begin{bmatrix} 0 & -2 & 1 \\ 2 & 0 & 2 \\ -1 & 2 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 4 & 3 \\ 4 & 8 & 0 \\ 3 & 0 & 7 \end{bmatrix}$

Answer: D

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23. If A is a matrix of order 3, such that

A (adj A) $= 10I$, then $|\text{adj A}| =$

A. 1

B. 10

C. 100

D. 10 I

Answer: C

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24. Consider the following statements :

(i) If any two rows or columns of a determinant are identical, then the value of the determinant is zero.

(ii) If the corresponding rows and columns of a determinant are interchanged, then the value of the determinant does not change.

(iii) If any two rows (or columns) of a determinant are interchanged , then the value of the determinant changes in sign.

Which of these are correct ?

A. (i) and (iii)

B. (i) and (ii)

C. (i), (ii) and (iii)

D. (ii) and (iii)

Answer: C

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25. The inverse of the matrix $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ is

A. $\frac{1}{24}\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

C. $\frac{1}{24}\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{4} \end{bmatrix}$

Answer: D

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26. If a, b and c are in A.P., then the value of $\begin{vmatrix} x+2 & x+3 & x+a \\ x+4 & x+5 & x+b \\ x+6 & x+7 & x+c \end{vmatrix}$ is

A. 0

B. $x-(a+b+c)$

C. $a+b+c$

D. $9x^2+a+b+c$

Answer: A

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27. The local minimum value of the function f' given by $f(x)=3+|x|, x \in R$ is

A. -1

B. 3

C. 1

D. 0

Answer: A::C

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28. A stone is dropped into a quiet lake and waves in circles at the speed of 5 cm/s. At the instant when the radius of the circular wave is 8 cm, how fast is the enclosed area increasing?

A. $6\pi cm^2 / s$

B. $8\pi cm^2 / s$

C. $\frac{8}{3} cm^2 / s$

D. $80\pi cm^2 / s$

Answer: D

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29. A gardener is digging a plot of land. As he gets tired, he works more slowly, After 't' minutes he is digging at a rate of $\frac{2}{\sqrt{t}}$ square metres per minute. How long will it take him to dig an area of 40 square metres ?

A. 100 minutes

B. 10 minutes

C. 30 minutes

D. 40 minutes

Answer: A

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30. The area of the region bounded by the lines $y = mx, x = 1, x = 2$, and x axis is 6sq. units then 'm' is

A. 3

B. 1

C. 2

D. 4

Answer: D

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31. Area of the region bounded by two parabolas $y = x^2$ and $x = y^2$ is

A. $\frac{1}{4}$

B. $\frac{1}{3}$

C. 4

D. 3

Answer: B

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32. The order and degree of the differential equation $y = x\frac{dy}{dx} + \frac{2}{\frac{dy}{dx}}$ is

A. 1, 2

B. 1, 3

C. 2, 1

D. 1, 1

Answer: A

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33. The general solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = 3x$ is

A. $y = x - \frac{c}{x}$

B. $y = x + \frac{c}{x}$

C. $y = x^2 - \frac{c}{x}$

D. $y = x^2 + \frac{c}{x}$

Answer: C::D

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34. The distance of the point P(a, b, c) from the x-axis is

A. $\sqrt{a^2+b^2}$

B. $\sqrt{b^2+c^2}$

C. a

D. $\sqrt{a^2+c^2}$

Answer: B

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35. Equation of the plane perpendicular to the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and passing through the point (2, 3, 4) is

A. $2x + 3y + z = 17$

B. $x + 2y + 3z = 9$

C. $3x + 2y + z = 16$

D. $x + 2y + 3z = 20$

Answer: D

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36. The line $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ is parallel to the plane

A. $2x + 3y + 4z = 0$

B. $3x + 4y + 5z = 7$

C. $2x + y - 2z = 0$

D. $x + y + z = 2$

Answer: C

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37. The angle between two diagonals of a cube is

A. $\cos^{-1}\left(\frac{1}{3}\right)$

B. 30°

C. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

D. 45°

Answer: A

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38. Lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-K}$ and $\frac{x-1}{K}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar if

A. $K=2$

B. $K=0$

C. $K=3$

D. $K=-1$

Answer: B

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39. A and B are two events such that $P(A)\neq 0$, $P(B/A)$ is

A. 1, 1

B. 0 and 1

C. 0, 0

D. $1, 0$

Answer: D

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40. Two dice are thrown simultaneously, the probability of obtaining a total score of 5 is

A. $\frac{1}{9}$

B. $\frac{1}{18}$

C. $\frac{1}{36}$

D. $\frac{1}{12}$

Answer: A

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41. If the events A and B are independent if $P(A') = \frac{2}{3}$ and $P(B') = \frac{2}{7}$, then $P(A \cap B)$ is equal to

A. $\frac{4}{21}$

B. $\frac{5}{21}$

C. $\frac{1}{21}$

D. $\frac{3}{21}$

Answer: B

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42. A box contains 100 bulbs, out of which 10 are defective. A sample of 5 bubls is drawn. The probability that none is defective is

A. $\frac{9}{10}$

B. $\left(\frac{1}{10}\right)^5$

C. $\left(\frac{9}{10}\right)^5$

D. $\left(\frac{1}{2}\right)^5$

Answer: C

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43. The area of the parallelogram whose adjacent sides are $\hat{i}+\hat{k}$ and $2\hat{i}+\hat{j}+\hat{k}$ is

A. 3

B. $\sqrt{2}$

C. 4

D. $\sqrt{3}$

Answer: D

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44. If $\vec{a}$ and $\vec{b}$ are two unit vectors inclined at an angle $\frac{\pi}{3}$, then the value of $\left|\vec{a}+\vec{b}\right|$ is

A. equal to 1

B. greater than 1

C. equal to 0

D. less than 1

Answer: B

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45. The value of $\left[\vec{a} - \vec{b}\,\vec{b} - \vec{c}\,\vec{c} - \vec{a}\right]$ is equal to

A. 0

B. 1

C. $2\left[\vec{a}\,\vec{b}\,\vec{c}\right]$

D. 2

Answer: A

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46. If $x + y \leq 2, x \geq 0, y \leq 0$ the point at which maximum value of $3x + 2y$ attained will be

A. (0, 2)

B. (0, 0)

C. (2, 0)

D. (1/2, 1/2)

Answer: C

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47. If $\sin\theta = \sin\alpha$, then

A. $\frac{\theta + \alpha}{2}$ is any multiple of $\frac{\pi}{2}$ and $\frac{\theta - \alpha}{2}$ is any odd multiple of π.

B. $\frac{\theta+\alpha}{2}$ is any odd multiple of $\frac{\pi}{2}$ and $\frac{\theta-\alpha}{2}$ is any multiple of π.

C. $\frac{\theta+\alpha}{2}$ is any multiple of $\frac{\pi}{2}$ and $\frac{\theta-\alpha}{2}$ is any even multiple of π.

D. $\frac{\theta+\alpha}{2}$ is any even multiple of $\frac{\pi}{2}$ and $\frac{\theta-\alpha}{2}$ is any odd multiple of π.

Answer:

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48. If $\tan x = \frac{3}{4}, \pi < x < \frac{3\pi}{2}$, then the value of $\cos. \frac{x}{2}$ is

A. $-\frac{1}{\sqrt{10}}$

B. $\frac{3}{\sqrt{10}}$

C. $\frac{1}{\sqrt{10}}$

D. $-\frac{3}{\sqrt{10}}$

Answer: A

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49. In a triangle ABC, $a[b\cos C - c\cos B] =$

A. 0

B. a^2

C. $b^2 - c^2$

D. b^2

Answer: C

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50. If α and β two different complex numbers with $|\beta| = 1$, then $\left|\frac{\beta - \alpha}{1 - \overline{\alpha}\beta}\right|$ is equal to

A. $\frac{1}{2}$

B. 0

C. -1

D. 1

Answer: D

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51. The set $A = \{x : |2x + 3| < 7\}$ is equal to the set

A. $D = \{x : 0 < x + 5 < 7\}$

B. $B = \{x : -3 < x < 7\}$

C. $E = \{x : -7 < x < 7\}$

D. $C = \{x : -13 < 2x < 4\}$

Answer: A

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52. How many 5 digit telephone numbers can be constructed using the digits 0 to 9, if each number starts with 67 and no digit appears more than once ?

A. 335

B. 336

C. 338

D. 337

Answer: B

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53. If 21^{st} and 22^{nd} terms in the expansion of $(1+x)^{44}$ are equal, then x is equal to

A. $\frac{8}{7}$

B. $\frac{21}{22}$

C. $\frac{7}{8}$

D. $\frac{23}{24}$

Answer: C

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54. Consider an infinite geometric series with first term 'a' and common ratio 'r'. If the sum is 4 and the second term is $\frac{3}{4}$ then

A. $a = 2, r = \frac{3}{8}$

B. $a = \frac{4}{7}, r = \frac{3}{7}$

C. $a = \frac{3}{2}, r = \frac{1}{2}$

D. $a = 3, r = \frac{1}{4}$

Answer: D

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55. A straight line passes through the points (5, 0) and (0, 3). The length of perpendicular from the point (4, 4) on the line is

A. $\frac{15}{\sqrt{34}}$

B. $\frac{\sqrt{17}}{2}$

C. $\frac{17}{2}$

D. $\sqrt{\frac{17}{2}}$

Answer: D

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56. Equation of circle with centre (-a, -b) and radius $\sqrt{a^2 - b^2}$ is

A. $x^2 + y^2 + 2ax + 2by + 2b^2 = 0$

B. $x^2 + y^2 - 2ax - 2by - 2b^2 = 0$

C. $x^2 + y^2 - 2ax - 2by + 2b^2 = 0$

D. $x^2 + y^2 - 2ax + 2by + 2a^2 = 0$

Answer: A

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57. The area of the triangle formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of latus rectum is

A. 20 sq. units

B. 18 sq. units

C. 17 sq. units

D. 19 sq. units

Answer: B

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58. If the coefficient of variation and standard deviation are 60 and 21 respectively, the arithmetic mean of distribution is

A. 60

B. 30

C. 35

D. 21

Answer: C

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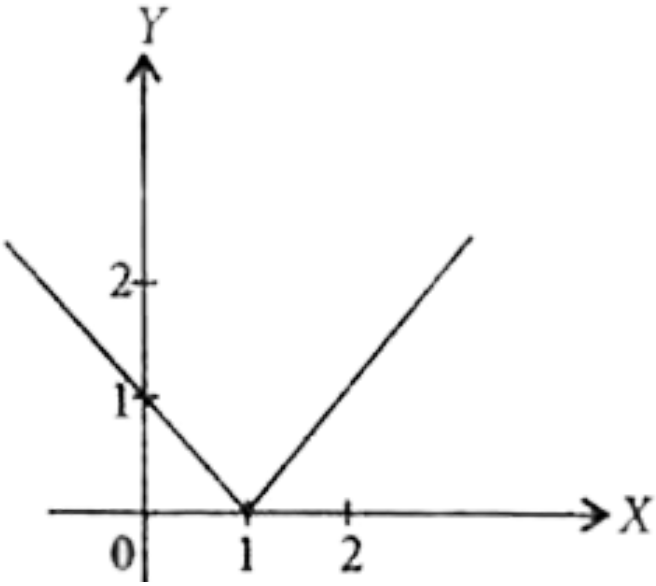
59. The function represented by the following graph is



A. Continuous but not differentiable at $x = 1$

B. Differentiable but not continuous at $x = 1$

C. Continuous and differentiable at $x = 1$

D. Neither continuous nor differentiable at $x = 1$

Answer: A

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60. If $f(x) = \begin{cases} \frac{3\sin \pi x}{5x}, & x \neq 0 \\ 2K, & x = 0 \end{cases}$ is continuous at $x = 0$, then the value of K is

A. $\frac{\pi}{10}$

B. $\frac{3\pi}{10}$

C. $\frac{3\pi}{2}$

D. $\frac{3\pi}{5}$

Answer: B

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