MATHS

BOOKS - XII BOARDS PREVIOUS YEAR

QUESTION PAPER 2022 TERM 1 SET 2

Section A

1. A relation R is defined on N. which of the following is the reflexive relation?

A. $R = \{(x, y) : x > y, x, y \in N\}$

B. $R = \{(x, y) : x + y = 10, x, y \in N\}$

C. $R = \{(x, y) : xy$ is the square number ,x,y $\in N\}$

D. $R = \{(x, y) : x + 4y = 10, x, y \in N\}$

Answer:

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2. The function $f : R \to R$ defined f(x) = 4+3 cos x is,

A. bijective

B. one-one but not onto

C. onto but not one-one

D. neither one-one nor onto

Answer:

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3. If $y = \cot^{-1} x, x < 0$, then :

A. $\frac{\pi}{2} < y \leq \pi$

B. $\frac{\pi}{2} < y < \pi$

C. $-\frac{\pi}{2} < y < 0$

D. $-\frac{\pi}{2} \leq y < 0$

Answer:

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4. The number of functions defined from $\{1, 2, 3, 4, 5\} \to \{a, b\}$ which are one - one is :

A. 5

B. 3

C. 2

D. 0

Answer:

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5. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, then (A -2I)(A-3I) is equal to :

A. A

B. I

C. 5I

D. O

Answer:

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6. If P is 3 x 3 matrix such that P' = 2P+I, where P' is the transpose of P , then :

A. P=I

B. P=-I

C. P=2I

D. P=-2I

Answer:

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7. If order of matrix A is 2×3,of matrix B is 3×2, and of matrix C is 3×3, then which one of the following is not defined ?

A. C (A+ B')

B. C (A+ B')'

C. BAC

D. CB+ A'

Answer:

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8. If $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $\left|A^3\right| = 27$ then the value of α is:

A. ± 1

B. ± 2

C. $\pm \sqrt{5}$

D. $\pm \sqrt{7}$

Answer:

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9. If $\begin{vmatrix} 5 & 3 & -1 \\ -7 & x & -3 \\ 9 & 6 & -2 \end{vmatrix} = 0$, then the value of x is:

A. 3

B. 5

C. 7

D. 9

Answer:

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10. The inverse of $\begin{bmatrix} -4 & 3 \\ 7 & -5 \end{bmatrix}$ is

A. $\begin{bmatrix} -5 & 3 \\ 7 & -4 \end{bmatrix}$

B. $\begin{bmatrix} 5 & 3 \\ 7 & 4 \end{bmatrix}$

C. $\begin{bmatrix} -5 & 7 \\ 3 & -4 \end{bmatrix}$

D. $\begin{bmatrix} -5 & -3 \\ -7 & -4 \end{bmatrix}$

Answer:

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11. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 59 & 69 & -1 \end{bmatrix}$, then A^{-1} :

A. is A

B. is (-A)

C. is A^2

D. does not exist

Answer:

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12. If the function f(x) = $\begin{cases} 3x-8, \text{if} & x \leq 5 \\ 2k, \text{if} & x > 5 \end{cases}$ is continuous, then the value of k is :

A. $\frac{2}{7}$

B. $\frac{7}{2}$

C. $\frac{3}{7}$

D. $\frac{4}{7}$

Answer:

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13. The function f(x) = [x], where [x] is the greatest integer function that is less than or equal to x, is continuous at :

A. 4

B. -2

C. 1.5

D. 1

Answer:

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14. If $y = \tan^{-1}\left(e^{2x}\right)$, then $\frac{dy}{dx}$ is equal to :

A. $\frac{2e^{2x}}{1+e^{4x}}$

B. $\frac{1}{1+e^{4x}}$

C. $\frac{2}{e^{2x}+e^{-2x}}$

D. $\frac{1}{e^{2x}-e^{-2x}}$

Answer:

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15. If $y^2(2-x) = x^3$, then $\left(\frac{dy}{dx}\right)_{(1,1)}$ is equal to :

A. 2

B. -2

C. 3

D. $-\frac{3}{2}$

Answer:

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16. The angle between the tangents to the curve $y = x^2 - 5x + 6$ at the point (2, 0) and (3, 0) is:

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

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

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

D. 0

Answer:

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17. The interval, in which function $y = x^3 + 6x^2 + 6$ is increasing, is :

A. $(-\infty, -4) \cup (0, \infty)$

B. $(-\infty, 4)$

C. $(-4, 0)$

D. $(-\infty, 0) \cup (4, \infty)$

Answer:

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18. The value of x for which $\left(x - x^2\right)$ is maximum, is :

A. $\frac{3}{4}$

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

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

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

Answer:

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19. If the corner points of the feasible region of an LPP are (0, 3), (3, 2) and (0, 5), then the minimum value of Z = 11x + 7y is :

A. 21

B. 33

C. 14

D. 35

Answer:

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20. The number of solutions of the system of inequations $x + 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$ is :

A. 0

B. 2

C. finite

D. infinite

Answer:

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Section B

1. The number of equivalence relations in the set (1, 2, 3) containing the elements (1, 2) and (2, 1) is :

A. 0

B. 1

C. 2

D. 3

Answer:

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2. Let f : R $\rightarrow$ R be defined by f(x) = $\frac{1}{x}$, for all $x \in R$.

Then, f is :

A. one-one

B. onto

C. bijective

D. not defined

Answer:

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3. The function f : N $\rightarrow$ N is defined by

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

The function f is :

A. bijective

B. one-one but not onto

C. onto but not one-one

D. neither one-one nor onto

Answer:

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4. The value of $\sin^{-1}\left(\cos\frac{13\pi}{5}\right)$ is :

A. $-\frac{3\pi}{5}$

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

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

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

Answer:

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5. If $\sin^{-1}x > \cos^{-1}$ x then x is

A. $\left(-1, -\frac{1}{\sqrt{2}}\right)$

B. $\left(0, \frac{1}{\sqrt{2}}\right)$

C. $\left(\frac{1}{\sqrt{2}}, 1\right]$

D. $\left(-\frac{1}{\sqrt{2}}, 0\right)$

Answer:

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6. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, then A + A' = I then the value of α is :

A. $\frac{\pi}{6}$

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

C. π

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

Answer:

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7. The determinant $\begin{vmatrix} y+k & y & y \\ y & y+k & y \\ y & y & y+k \end{vmatrix}$ is equal to :

A. $k\left(3y+k^2\right)$

B. $3y+k^2$

C. $3y+k^2$

D. $k^2(3y+k)$

Answer:

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8. If $A=\begin{bmatrix}1 & -2 & 4\\ 2 & -1 & 3\\ 4 & 2 & 0\end{bmatrix}$ is the adjoint of a square matrix B, then B^{-1} is equal to :

A. $\pm A$

B. $\pm\sqrt{2}A$

C. $\pm\frac{1}{\sqrt{2}}B$

D. $\pm\frac{1}{\sqrt{2}}A$

Answer:

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9. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -1 & 1 \\ 1 & -1 & 1 \end{bmatrix}$, then $A^5 - A^4 - A^3 + A^2$ is equal to :

A. 2A

B. 3A

C. 4A

D. 0

Answer:

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10. If $y = e^{-x}$, then $\frac{d^2y}{dx^2}$ is equal to :

A. $-y$

B. y

C. x

D. $-x$

Answer:

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11. If $x = t^2 + 1, y = 2at$ then $\frac{d^2y}{dx^2}$ at t = a is :

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

B. $-\frac{1}{2a^2}$

C. $\frac{1}{2a^2}$

D. 0

Answer:

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12. The function f(x) $\begin{cases} x^2 & \text{for} \quad x < 1 \\ 2 - x & \text{for} \quad x \geq 1 \end{cases}$ is

A. not differentiable at x =1

B. differentiable at x =1

C. not continuous at x = 1

D. neither continuous nor differentiable at x = 1

Answer:

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13. The curve $x^2 - xy + y^2 = 27$ has tangents parallel to x-axis at :

A. (3,6) and (-3,-6)

B. (3,-6) and (-3, 6)

C. (-3,-6) and (3,-6)

D. (-3,6) and (-3,-6)

Answer:

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14. A wire of length 20 cm is bent in the form of a sector of a circle. The maximum area that can be enclosed by the wire is :

A. 20 sq cm

B. 25 sq cm

C. 10 sq cm

D. 30 sq cm

Answer:

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15. The function (x-sin x) decreases for :

A. all x

B. $x < \frac{\pi}{2}$

C. $0 < x < \frac{\pi}{4}$

D. no value of x

Answer:

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16. If θ is the angle of intersection between the curves $y^2 = 4ax$ and $ay = 2x^2$ at (a,2a), then the value of $\tan\theta$ is :

A. $\frac{3}{5}$

B. $\frac{2}{3}$

C. $\frac{3}{4}$

D. $\frac{2}{5}$

Answer:

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17. The maximum value of z =3x+4y subject to the constraints $x \geq 0, y \geq 0$ and $x + y \leq 1$ is

A. 7

B. 4

C. 3

D. 10

Answer:

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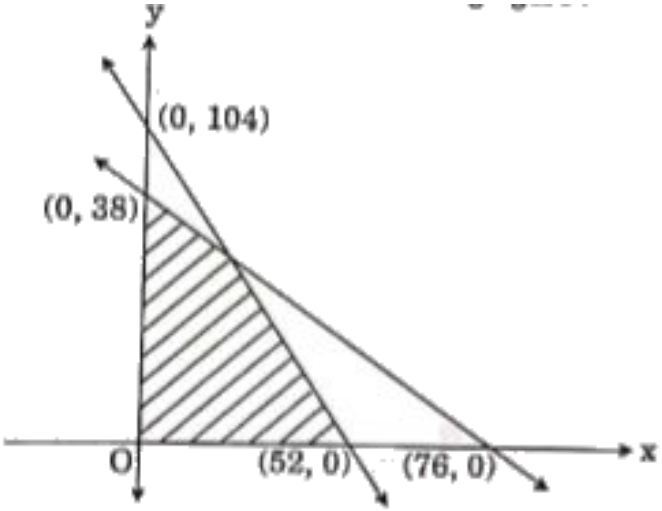
18. The feasible region of an LPP is given in the following figure :



Then, the constraints of the LPP are $x \geq 0, y \geq 0$ and

A. $2x + y \leq 52$ and $x + 2y \leq 76$

B. $2x + y \leq 104$ and $x + 2y \leq 76$

C. $x + 2y \leq 104$ and $2x + y \leq 76$

D. $x + 2y \leq 104$ and $2x + y \leq 38$

Answer:

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19. If the minimum value of an objective function $Z = ax + by$ occurs at two points (3, 4) and (4, 3), then :

A. $a + b = 0$

B. $a = b$

C. $3a = b$

D. $a = 3b$

Answer:

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20. For the following LPP

Maximise Z = 3x + 4y

subject to constraints

$x - y \geq -1, x \leq 3$

$x \geq 0, y \geq 0$

the maximum value is :

A. 0

B. 4

C. 25

D. 30

Answer:

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Section C

1. A relation R is defined on Z as :

aRb if and only if $a^2 - 7ab + 6b^2 = 0$

Then , R is :

A. reflexive and symmetric

B. symmetric but not reflexive

C. transitive but not reflexive

D. reflexive but not symmetric

Answer:

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2. The value of

$$\begin{vmatrix} \lfloor 1 & \lfloor 2 & \lfloor 3 \\ 2\lfloor 2 & 3\lfloor 3 & 4\lfloor 4 \\ \lfloor 3 & \lfloor 4 & \lfloor 5 \end{vmatrix}$$

is :

A. 12

B. -12

C. 24

D. -24

Answer:

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3. If

$$A = \begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$$

then (A) $a = b \equiv -1$ (B) $a = \sin 2\theta, b = \cos 2\theta$ (C)

$a = \cos 2\theta, b = \sin 2\theta$ (D) none of these

A. $a = 1 = b$

B. $a = \cos 2\theta, b = \sin 2\theta$

C. $a \sin 2\theta, b = \cos 2\theta$

D. $a = \cos \theta, b = \sin \theta$

Answer:

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4. The normal to the curve $3y = 6x - 5x^3$ at the point $\left(1, \frac{1}{3}\right)$ passes through the point :

A. (3, 1)

B. (3, 2)

C. (2, 3)

D. (1, 1)

Answer:

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5. If $y = \sin\left(2\sin^{-1}x\right)$, then $\left(1-x^2\right)y_2$ is equal to :

A. $-xy_1 + 4y$

B. $-xy_1 - 4y$

C. $xy_1 - 4y$

D. $xy_1 + 4y$

Answer:

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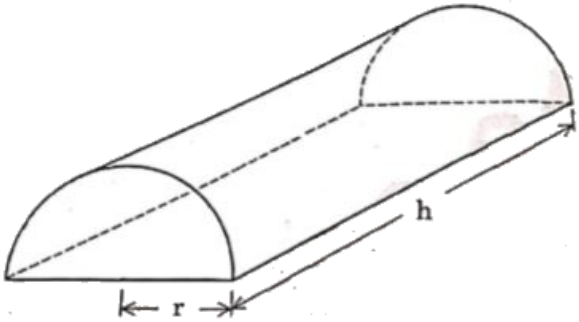
6. Some young entrepreneurs started an industry "young achievers" for casting metal into various shapes . They put up and advertisement online stating the same and expecting order to cast metal for toys, sculptures , decorative pieces and more .

A group of friends wanted to make innovative toys and hence contacted the "young achievers" to order them to cast metal into solid half cylinders with a rectangular based semi-circular ends



Based on the above informtion , answer the following questions:

The volume (V) of the casted half cylinder will be :

A. $\pi r^2 h$

B. $\frac{1}{3}\pi r^2 h$

C. $\frac{1}{2}\pi r^2 h$

D. $pr^2(r+h)$

Answer:

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7. Some young entrepreneurs started an industry "young achievers" for casting metal into various shapes . They put up and advertisement online stating the same and expecting order to cast metal for toys, sculptures , decorative pieces and more .

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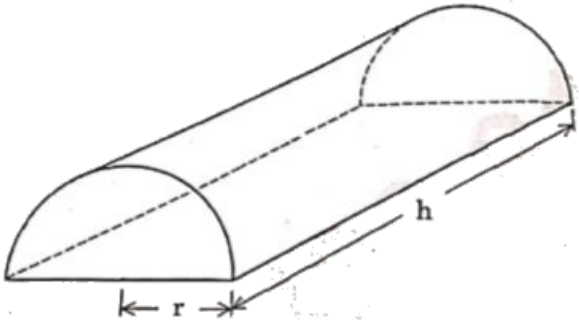

Based on the above informtion , answer the following questions:

The total surface area(S) of the casted half cylinder will be :

A. $\pi rh + 2\pi r^2 + rh$

B. $\pi rh + \pi r^2 + 2rh$

C. $2\pi rh + \pi r^2 + 2rh$

D. $\pi rh + \pi r^2 + rh$

Answer:

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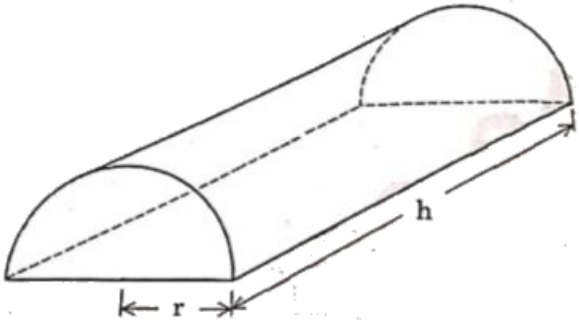
8. Some young entrepreneurs started an industry "young achievers" for casting metal into various shapes . They put up and advertisement online stating the same and expecting order to cast metal for toys, sculptures , decorative pieces and more .

A group of friends wanted to make innovative toys and hence contacted the "young achievers" to order them to cast metal into solid half cylinders with a rectangular based semi-circular ends



Based on the above informtion , answer the following questions:

The total surface area S can be expressed in terms of V and r as :

A. $2\pi r + \frac{2V(\pi + 2)}{\pi r}$

B. $2\pi r + \frac{2V}{\pi r}$

C. $\pi r^2 + \frac{2V(\pi + 2)}{\pi r}$

D. $2\pi r^2 + \frac{2V(\pi + 2)}{\pi r}$

Answer:

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9. Some young entrepreneurs started an industry "young achievers" for casting metal into various shapes . They put up and advertisement online stating the same and expecting order to cast metal for toys, sculptures , decorative pieces and more .

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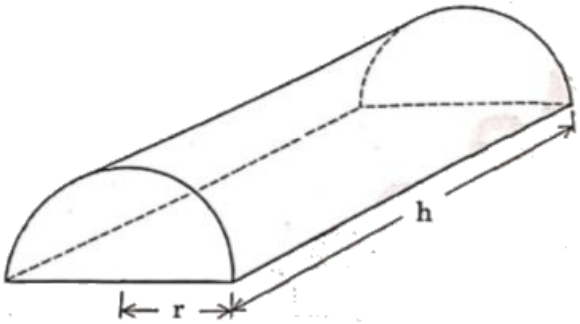

Based on the above informtion , answer the following questions:

For the given half- cylinder of volume V, the total surface area S is minium , when:

A. $(\pi + 2)V = \pi^2 r^3$

B. $(\pi + 2)V = \pi^2 r^3$

C. $2(\pi + 2)V = \pi^2 r^3$

D. $(\pi + 2)V = \pi^2 r$

Answer:

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10. Some young entrepreneurs started an industry "young achievers" for casting metal into various shapes . They put up and advertisement online stating the same and expecting order to cast metal for toys, sculptures , decorative pieces and more .

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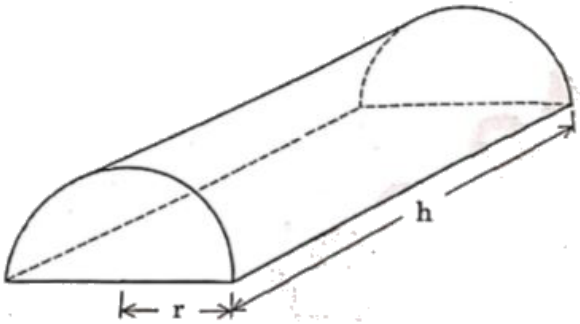

Based on the above informtion , answer the following questions:

The ratio h: 2r for S to be minimum will be equal to :

A. $2\pi : \pi + 2$

B. $2\pi : \pi + 1$

C. $\pi : \pi + 1$

D. $\pi : \pi + 2$

Answer:

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