MATHS

BOOKS - TARGET MATHS (HINGLISH)

MHT-CET 2019 QUESTION PAPER

Trignometric Functions

1. If $\cos\theta + \sec\theta = 2$, then $\sec^2\theta - \sin^2\theta =$

A. 3

B. 4

C. 1

D. 2

Answer: C

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2. The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is

A. 0

B. 2

C. 6

D. 4

Answer: C

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3. If $\frac{1}{\sqrt{2}} \leq x \leq 1$ and $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = A + B\sin^{-1}x$, then (A,B)=

A. $(\pi, 2)$

B. (0,2)

C. $(\pi, -2)$

D. (0,-2)

Answer: C

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4. $\cot x = -\sqrt{3}$

A. $n\pi \pm \frac{\pi}{6}, n \in Z$

B. $2n\pi \pm \frac{\pi}{6}, n \in Z$

C. $n\pi + \frac{\pi}{6}, n \in Z$

D. $n\pi + \frac{5\pi}{6}, n \in Z$

Answer: D

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5. In $\triangle ABC$, with usual notations b=2c and B=3C, then sinA=

A. $\frac{\sqrt{3}}{2}$

B. 1

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

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

Answer: A

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Trignometric Functions Of Compound Angles

1. If $A - B = \frac{\pi}{4}$, then (1+tanA)(1-tanB)=

A. 4

B. 3

C. 1

D. 2

Answer: D

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Straight Lines

1. If A(5,8),B(-3,4) and C(7,k) are vertices of $\triangle ABC$ and $m\angle B = 90^\circ$, then k=

A. 16

B. -12

C. -16

D. 12

Answer: C

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Circles And Conics

1. The cordinate of point P is 8. If P lies on the parabola $y^2 = 16x$, then its focal distance is

A. 16

B. 32

C. 8

D. 4

Answer: C

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2. The focai of the conjugate hyperbola of the hypberbola $\frac{x^2}{144} - \frac{y^2}{25} = 1$ are

A. (5,0), (-5,0)

B. (13,0),(-13,0)

C. (0,12),(0,-12)

D. (0,13),(0,-13)

Answer: D

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Sets Relations And Functions

1. Which of the following is an evan function?

A. $f(x) = 3\cos x + 4$

B. $f(x) = 2\sin x + 3$

C. $f(x) = x^2 + x$

D. $f(x) = x^2 \sin x$

Answer: A

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2. The domain of the function $f(x) = \sqrt{\sin x} + \sqrt{16 - x^2}$ is

A. $[-4, 0) \cup (0, \pi]$

B. $(-4, 4)$

C. $[-4, \pi] \cup [0, \pi]$

D. $[-4, \pi]$

Answer: C

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Sequence And Series

1. If $x > 0, y > 0$ then minimum value of $(x+y)\left(\frac{1}{x}+\frac{1}{y}\right)$ is

A. 10

B. 6

C. 4

D. 8

Answer: C

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2. If $t_n = \frac{1}{(n+1)!}$, then $\sum_{n=1}^{\infty} t_n =$

A. e+2

B. e-2

C. e+1

D. e-1

Answer: B

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Probability

1. A room contains 3 sockets for bulbs. If from a collection of 10 bulbs, out of which 6 are defective, 3 bulbs are selected at random and put in the sockets, then the probability that the room is lighted is

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

B. $\frac{1}{5}$

C. $\frac{5}{6}$

D. $\frac{1}{6}$

Answer: C

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2. The negative of the statement "some equations have real roots" is

A. All equations do not have real roots

B. All equations have real roots

C. Some equations do not have real roots

D. Some equations have rational roots

Answer: A

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3. If truth values of p, $p \Rightarrow r, q \Rightarrow p$ are F, T, F respectively, then respective truth values of q and r

A. F,T

B. T,T

C. F,F

D. T,F

Answer: D

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4. If p: Rahul is physically disable, q: Rahul stood first in the class, then the statement "In spite of physical disability Rahul stood first in the class in symbolic form is

A. $p \wedge q$

B. $p \vee q$

C. $\sim p \vee q$

D. $p \rightarrow q$

Answer: A

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Matrixes

1. For a invertible matrix A if $A(adjA) = \begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$ then $|A| =$

A. 10

B. 100

C. 20

D. 0

Answer: A

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2. If the inverse of $\begin{bmatrix} 1 & 2 & x \\ 4 & -1 & 7 \\ 2 & 4 & -6 \end{bmatrix}$ does not exist, then

x=

A. -3

B. 0

C. 2

D. 3

Answer: A

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Pair Of Straight Lines

1. The measure of the angle between the lines

$\left(\sin^2\theta - 1\right)x^2 - 2xy\cos^2\theta + y^2\cos^2\theta = 0$ is

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

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

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

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

Answer: A

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2. If m_1 and m_2 are slopes of line represented $2x^2 - 3xy + y^2 = 0$, then $(m_1)^3 + (m_2)^3 =$

A. 1

B. 9

C. 3

D. 27

Answer: B

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Vectors

1. If

$A \equiv (3, x, 1), B \equiv (y, -2, 2), C \equiv (2x, 2y, -3)$

are the vectors of $\triangle ABC$ and $G \equiv (2, 1, 0)$ is its centroid, then

A. $x = -\frac{1}{3}, y = -\frac{7}{3}$

B. $x = \frac{7}{3}, y = \frac{1}{3}$

C. $x = \frac{1}{3}, y = \frac{7}{3}$

D. $x = \frac{5}{3}, y = \frac{4}{3}$

Answer: C

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2. If $\bar{a}, \bar{b}, \bar{c}$ are coplanar unit vectors, then

$\left[2\bar{a} - \bar{b}, 2\bar{b} - \bar{c}, 2\bar{c} - \bar{a}\right] =$

A. 0

B. 1

C. $\sqrt{3}$

D. $-\sqrt{3}$

Answer: A

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3. Let a, b and c be distinct non-negative numbers. If vectos $a\hat{i} + a\hat{j} + c\hat{k}, \hat{i} + \hat{k}$ and $c\hat{i} + c\hat{j} + b\hat{k}$ are coplanar, then c is

A. A.M. of a and b

B. G.M of a and b

C. Sum of a and b

D. H.M. of a and b

Answer: B

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4. The vector equation of the plance passing through the point $(-1, 2, -5)$ and parallel to vectors $4\hat{i} - \hat{j} + 3\hat{k}$ and $\hat{i} + \hat{j} - \hat{k}$ is

A. $\bar{r}.\left(-2\hat{i} + 7\hat{j} + 5\hat{k}\right) = -9$

B. $\bar{r}.\left(2\hat{i} + 7\hat{j} + 5\hat{k}\right) = -13$

C. $\bar{r}.\left(2\hat{i}-7\hat{j}+5\hat{k}\right)=9$

D. $\bar{r}.\left(2\hat{i}-7\hat{j}-5\hat{k}\right)=-9$

Answer: A

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5. If Z=2x + y subject to $x \leq 4, y \leq 6, x+y \geq 6, x \geq 0, y \geq 0,$ then the maximum value of Z is

A. 18

B. 10

C. 6

D. 14

Answer: D

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Three Dimensional Geometry

1. If a line in the space passes through the points (x_1, y_1, z_1) and (x_2, y_2, z_2) then its direction consines are proportional to

A. x_1x_2, y_1y_2, z_1, z_2

B. $x_1^2 - x_2^2, y_1^2 - y_2^2, z_1^2 - z_2^2$

C. $x_1 + x_2, y_1 + y_2, z_1 + z_2$

D. $x_1 - x_2, y_1 - y_2, z_1 - z_2$

Answer: D

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Line

1. The cartesian equation of the line $\bar{r} = \left(\hat{i} + \hat{j} + \hat{k}\right) + \lambda\left(\hat{j} + \hat{k}\right)$ is

A. x=1, y=z

B. $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-1}{2}$

C. x=y=z

D. x-1=y=z

Answer: A

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Plane

1. The XZ plane divides the line segment joining the points (3,2,b) and (a,-4,3) in the ratio

A. $1:2$

B. $2:3$

C. $3:1$

D. $4:3$

Answer: A

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Linear Programming

1. The objective function Z=6x +2y is subject to $5x + 9y \leq 90, x + y \geq 4, y \leq 8, x, y \geq 0.$ The miniumum value of Z occurs at

A. (0,2)

B. (0,4)

C. (4,0)

D. (18,0)

Answer: B

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Continuity

1. In order that the function $f(x) = (x+1)^{\cot x}$ is continuous at x=0 , the value of f(0) must be defined as :

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

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

C. e

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

Answer: C

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2. If f(x) is continuous at x=a, where $f(x) = \frac{\sqrt{x} - \sqrt{a} + \sqrt{x-a}}{\sqrt{x^2 - a^2}}$, for $x \neq a$, then f(a)=

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

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

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

D. $2\sqrt{a}$

Answer: A

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Differentiation

1. Examine the differentiability of f, where f is defined by

$$f(x) = \begin{cases} 1+x & \text{if } x \leq 2 \\ 5-x & \text{if } x > 2 \end{cases} \text{ at } x = 2.$$

A. does not exist

B. 3

C. -1

D. 1

Answer: A

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2. If $y = \text{cosec}^{-1}\left(\frac{x^2+1}{x^2-1}\right) + \cos^{-1}\left(\frac{x^2-1}{x^2+1}\right)$, then $\frac{dy}{dx} =$

A. $-\frac{2}{\sqrt{x^4-1}}$

B. 0

C. $\frac{2}{\sqrt{x^4-1}} + \frac{2}{\sqrt{x^4+1}}$

D. $\frac{2}{\sqrt{x^4+1}}$

Answer: B

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3. If $x = t\log t, y = t^t, then\frac{dy}{dx} =$

A. e^t

B. 1 + log t

C. $\frac{e^t}{1+\log t}$

D. e^x

Answer: D

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Application Of Derivatives

1. If $f(x) = x^3 - 3x$ has maximum value at x=a, then a=

A. -1

B. -3

C. 1

D. 3

Answer: C

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2. If Rolle's theorem holds for the function $f(x) = x^3 + bx^2 + ax - 6$ for $x \in [1, 3]$, then a+4b=

A. 13

B. -26

C. -13

D. 26

Answer: C

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3. Equation of the horizonatl tangent to the curve $y = e^x + e^{-x}$ is

A. y=-1

B. y=1

C. $y = -2$

D. y=2

Answer: D

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Integration

1. If $\int \frac{1}{\sqrt{9-16x^2}} dx = a \sin^{-1}(bx) + c$, then 4a+3b=

A. -12

B. 5

C. -17

D. 25

Answer: B

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2. $\int \frac{1}{3+2\cos^2 x}\,dx=$

A. $\frac{1}{15}\tan^{-1}\left(\frac{\sqrt{3}\tan x}{\sqrt{5}}\right)+c$

B. $\frac{1}{\sqrt{6}}\tan^{-1}\left(\frac{\sqrt{2}\cos x}{\sqrt{3}}\right)+c$

C. $\frac{1}{\sqrt{15}}\tan^{-1}\left(\frac{\sqrt{5}\tan x}{\sqrt{3}}\right)+c$

D. $-\frac{1}{\sqrt{15}}\tan^{-1}\left(\frac{3\tan x}{5}\right)+c$

Answer: A

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3. If $\int x^2 e^{3x}dx = \frac{e^{3x}}{27}f(x)+c$, then f(x)=

A. $9x^2+6x+2$

B. $9x^2-6x+2$

C. $9x^2+6x+2$

D. $9x^2-6x-2$

Answer: B

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Definite Integrals

1. $\int_0^1 \frac{1}{x+\sqrt{x}} dx =$

A. log 4

B. log 2

C. log 3

D. log 5

Answer: A

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2. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \log\left(\frac{2-\sin x}{2+\sin x}\right) dx =$

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

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

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

D. 0

Answer: D

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Applications Of Definite Integral

1. The area of the region bounded by parabola $y^2 = 16x$ and its locus rectum is _____

A. $\frac{256}{3}$

B. $\frac{128}{3}$

C. $\frac{16}{3}$

D. $\frac{64}{3}$

Answer: B

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Differential Equations

1. The solution of $\frac{dy}{dx} = \frac{y+1}{x+1}$ when y(1) =2, is

A. 2x-y =0

B. $x^2 + y^2 = 5$

C. 3x + 2y -7=0

D. 3x - 2y +1=0

Answer: D

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2. The rate of increase in the number of bacteria in a certain bacteria culture is proportional to the number

present. If in 5 hrs the number triples, then in 10 hrs, the number of bacteria present is

A. 18 times the original

B. 12 times the original

C. 6 times the original

D. 9 times the original

Answer: D

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3. The order of the differential equation of all rectangular hyperbola is

A. two

B. four

C. one

D. three

Answer: C

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Probability Distribution

1. The p.d.f. of a r.v. X is $f(x) = \begin{cases} kx, 0 < x < 2 \\ 0, \text{otherwise} \end{cases}$, then k =

A. 2

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

C. 0

D. 1

Answer: B

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Binomial Distribution

1. If in a certain experiment the probability of success in each trial is $\frac{3}{4}$ times the probability of failure, then the probability of at least one success in 5 trials is

A. $1-\left(\frac{3}{7}\right)^5$

B. $\left(\frac{3}{7}\right)^5$

C. $\left(\frac{4}{5}\right)^5$

D. $1-\left(\frac{4}{7}\right)^5$

Answer: D

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