MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2012

Mathematics

1. All letters of the word 'CEASE' are arranged randomly in a row, then the probability that 2

E are found together is

A. $\frac{7}{5}$

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

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

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

Answer: D

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2. Three numbers are chosen from 1 to 20. Find the probability that they are consecutive.

A. $\frac{7}{190}$

B. $\frac{3}{190}$

C. $\frac{5}{190}$

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

Answer: B

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3. If the four positive integers are selected randomly from the set of positive integers, then the probability that the number 1,3, 7 and 9 are in the unit place in the product of 4 - digit, so selected is

A. $\frac{7}{625}$

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

C. $\frac{5}{625}$

D. $\frac{16}{625}$

Answer: D

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4. If the position vectors of the vertices A, B and C are 6i, 6j and k respectively w.r.t origin O, then the volume of the tetrahedron OABC is

A. 6

B. 3

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

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

Answer: A

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5. Find the constant a so that the following vectors are coplaner

$2i - j + k, i + 2j - 3k, 3i + aj + 5k$

A. -4

B. -2

C. -1

D. -8

Answer: D

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6. Find a vector of magnitude 9, which is perpendicular to both vectors $4\hat{i} - \hat{j} + 3\hat{k} and - 2\hat{i} + \hat{j} - 2\hat{k}$.

A. $3i + 6j - 6k$

B. $3i - 6j + 6k$

C. $-3i + 6j + 6k$

D. None of the above

Answer: C

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7. The area of the region bounded by the curves $x^2 + y^2 = 8$ and $y^2 = 2x$ (in sq. unit) is

A. $2\pi + \frac{1}{3}$

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

C. $2\pi + \frac{4}{3}$

D. $\pi + \frac{4}{3}$

Answer: C

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8. $\int_0^{\pi} \log(1+\cos x)dx$.

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

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

C. $\pi \log 2$

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

Answer: B

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9. The value of $\int_3^4 \sqrt{(4-x)(x-3)}dx$ is

A. $\frac{\pi}{16}$

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

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

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

Answer: B

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10. The value of $\int \frac{dx}{x(x^n+1)}$

A. $\frac{1}{n}\log\left(\frac{x^n}{x^n+1}\right)+C$

B. $\log\left(\frac{x^n+1}{x^n}\right)+C$

C. $\frac{1}{n}\log\left(\frac{x^n+1}{x^n}\right)+C$

D. $\log\left(\frac{x^n}{x^n+1}\right)+C$

Answer: A

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11. $\int \cos(\log x)\,dx$

A. $\frac{1}{2}[\sin(\log x) + \cos(\log x)] + C$

B. $\frac{x}{2}[\sin(\log x) + \cos(\log x)] + C$

C. $\frac{x}{2}[\sin(\log x) - \cos(\log x)] + C$

D. $\frac{1}{2}[\sin(\log x) - \cos(\log x)] + C$

Answer: B

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12. $\int e^x \left(\frac{1+\sin x}{1+\cos x} \right) dx$

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

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

C. $\frac{1}{2} e^x \tan \frac{x}{2} + C$

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

Answer: D

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13. The value of $\int \frac{1}{3\sin x - \cos x + 3} dx$ is equal to

A. $\log\left(\frac{\tan\frac{x}{2}+1}{2\tan\frac{x}{2}+1}\right)+C$

B. $\frac{1}{2}\log\left(\frac{2\tan\frac{x}{2}+1}{\tan\frac{x}{2}+1}\right)+C$

C. $\log\left(\frac{2\tan\frac{x}{2}+1}{\tan\frac{x}{2}+1}\right)+C$

D. $2\log\left(\frac{2\tan\frac{x}{2}+1}{\tan\frac{x}{2}+1}\right)+C$

Answer: C

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14. Divide 10 into two parts such that the sum of double of the first and the square of the second is minimum

A. $(6, 4)$

B. $(7, 3)$

C. $(8, 2)$

D. $(9, 1)$

Answer: D

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15. $\int \frac{\sin(2x)}{\sin^4 x + \cos^4 x} dx$

A. $\tan^{-1}\left(\cot^2 x\right) + C$

B. $-\tan^{-1}(\cos 2x) + C$

C. $\tan^{-1}(\sin 2x) + C$

D. $\tan^{-1}\left(\tan^2 x\right) + C$

Answer: B

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16. $\int \sqrt{1+\sec x}dx$

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

B. $2\sin^{-1}\left(\sqrt{2}\sin x/2\right)+C$

C. $2\sin^{-1}\left(\sqrt{2}\sin x\right)+C$

D. $2\sin^{-1}\left(\sqrt{2}x/2\right)+C$

Answer: B

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17. The value of $\int \frac{(x^2+1)}{x^4+x^2+1}dx$ is

A. $\frac{1}{\sqrt{3}}\tan^{-1}\left\{\frac{x-1/x}{\sqrt{3}}\right\}+C$

B. $\frac{1}{2\sqrt{3}}\log\left\{\frac{(x-1/x)-\sqrt{3}}{(x-1/x)+\sqrt{3}}\right\}+C$

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

D. $\tan^{-1}\left(\frac{x-1/x}{\sqrt{3}}\right)+C$

Answer: A

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18. The value of $\int_0^1 x^2\left(1-x^2\right)^{3/2}dx$ is

A. $\frac{1}{32}$

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

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

D. $\frac{\pi}{32}$

Answer: D

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19. The value of $\int_0^{\infty} \frac{x}{(1+x)(x^2+1)} dx$ is

A. 2π

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

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

D. $\frac{\pi}{32}$

Answer: B

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20. The area of the region bounded by the curves $y^2 = 8x$ and y = x (in sq unit) is

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

B. $\frac{32}{3}$

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

D. $\frac{8}{3}$

Answer: B

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21. If $O \text{ and } O'$ are circumcentre and orthocentre of ABC, $\text{then } \overrightarrow{O}A + \overrightarrow{O}B + \overrightarrow{O}C$ equals $2\overrightarrow{O}O'$ b. $\overrightarrow{O}O'$ c. $\overrightarrow{O}'O$ d. $2\overrightarrow{O}'O$

A. $2O'O$

B. $O'O$

C. OO'

D. $2OO'$

Answer: A

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22. If $\vec{a}+\vec{b}+\vec{c}=\vec{0}, |\vec{a}|=3, |\vec{b}|=5, |\vec{c}|=7$, then angle between $\vec{a}$ and $\vec{b}$ is

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

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

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

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

Answer: B

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23. $i(j \times k) + j(k \times i) + k(j \times i)$ is equal to

A. 3

B. 2

C. 1

D. 0

Answer: C

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24. One card is drawn at random from a pack of playing cards the probability that it is an ace or black king or the queen of the heart will be

A. $\frac{3}{52}$

B. $\frac{7}{52}$

C. $\frac{6}{52}$

D. $\frac{1}{52}$

Answer: B

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25. 15 coins are tossed , the probability of getting heads will be

A. $\frac{511}{32768}$

B. $\frac{1001}{32768}$

C. $\frac{3003}{32768}$

D. $\frac{3005}{32768}$

Answer: C

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26. The odds against solving a problem by A and B are 3 :2 and 2 : 1 respectively, then the probability that the problem will be solved, is

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

B. $\frac{2}{15}$

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

D. $\frac{11}{5}$

Answer: A

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27. The line $lx + my + n = 0$ is a normal to the parabola $y^2 = 4ax$ if

A. $\left(\frac{-n}{l}, \frac{-2am}{l}\right)$

B. $\left(\frac{-n}{l}, \frac{2am}{l}\right)$

C. $\left(\frac{n}{l}, \frac{-2am}{l}\right)$

D. $\left(\frac{n}{l}, \frac{2am}{l}\right)$

Answer: C

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28. The line $2x + y + \lambda = 0$ is a normal to the parabola $y^2 = -8x,$ is λ=

A. -24

B. 8

C. -16

D. 24

Answer: A

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29. The line $lx + my + n = 0$ is a normal to the parabola $y^2 = 4ax$ if

A. $mn = al^2$

B. $lm = an^2$

C. $\ln = am^2$

D. None of the above

Answer: C

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30. $f: R \to R,$ then $f(x) = x|x|$ will be

A. maney - one - onto

B. one - one - onto

C. many -one -into

D. one - one - into

Answer: B

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31. $\lim_{x \to \pi/2} (\sec x - \tan x)$ is equal to

A. 2

B. -1

C. 1

D. 0

Answer: D

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32. If

$$f(x) = \begin{cases} \dfrac{\log(1+2ax) - \log(1-bx)}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$$

is

continuous at x = 0, then value of k is

A. $b + a$

B. $b - 2a$

C. $2a - b$

D. $2a + b$

Answer: D

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33. If $f(x) = |x - 3|$, then $f'(3)$ is

A. -1

B. 1

C. 0

D. does not exist

Answer: D

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34. If $\tan x = \frac{2t}{1-t^2}$ and $\sin y = \frac{2t}{1+t^2}$,

then the value of

$\frac{dy}{dx}$ is

A. 1

B. t

C. $\frac{1}{1-t}$

D. $\frac{1}{1+t}$

Answer: A

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35. If $x^p + y^q = (x+y)^{p+q}, \quad \text{then} \frac{dy}{dx}$ is

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

B. $\frac{x}{y}$

C. $-\frac{y}{x}$

D. $\frac{y}{x}$

Answer: D

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36. All points on the curve $y^2 = 4a\left(x + a \sin\frac{x}{a}\right)$ at which the tangents are parallel to the axis of x lie on a

A. circle

B. parabola

C. straight line

D. None of these

Answer: B

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37. The length of normal at any point to the curve, $y = c\cosh\left(\frac{x}{c}\right)$ is

A. fixed

B. $\frac{y^2}{c^2}$

C. $\frac{y^2}{c}$

D. $\frac{y}{c^2}$

Answer: C

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38. The height of right circular cylinder of maximum volume in a sphere of diameter $2a$ is

A. $2\sqrt{3}a$

B. $\sqrt{3}a$

C. $\frac{2a}{\sqrt{3}}$

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

Answer: C

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39. If and k are segments of a focal chord of the parabola $y^2 = 4ax$, then k =

A. $\frac{ab}{a-b}$

B. $\frac{a}{b-a}$

C. $\frac{b}{b-a}$

D. $\frac{ab}{b-a}$

Answer: D

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40. The equation of directrix is to the parabola

$4x^2 - 4x - 2y + 3 = 0$ will be

A. $2y = 1$

B. $2x = 1$

C. $2y = 3$

D. $2x = 3$

Answer: A

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41. If $f(x) = \frac{2^x + 2^{-x}}{2}$, then $f(x+y)f(x-y)$ is equals to

$\frac{1}{2}\{f(2x)+f(2y)\}$ (b) $\frac{1}{2}\{f(2x)-f(2y)\}$ (c) $\frac{1}{4}\{f(2x)+f(2y)\}$ $\frac{1}{4}\{f(2x)-f(2y)\}$

A. $\frac{1}{4}[f(2x)-f(2y)]$

B. $\frac{1}{2}[f(2x)-f(2y)]$

C. $\frac{1}{4}[f(2x)+f(2y)]$

D. $\frac{1}{2}[f(2x)+f(2y)]$

Answer: D

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42. The period of $|\cos x|$, is

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

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

C. π

D. 2π

Answer: C

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43. $\lim_{x \to 0} \left(\frac{3^x - 1}{x} \right)$ is equal to

A. $2 \log 3$

B. $3 \log 3$

C. $\log 3$

D. None of these

Answer: C

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44. If $f(x) = \begin{cases} x^k \sin\left(\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$ is continuous at x = 0, then

A. contiuous

B. differentiable

C. continuous but not differentiable

D. None of the above

Answer: C

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45. The equation of the circle whose diameter is common chord to the circles

A.

$$x^2+y^2-\frac{2ab^2}{a^2+b^2}x+\frac{2a^2b}{a^2+b^2}y+c=0$$

B.

$$x^2+y^2-\frac{2ab^2}{a^2+b^2}x+\frac{2a^2b}{a^2+b^2}y+c=0$$

C.

$$x^2+y^2+\frac{2ab^2}{a^2+b^2}x+\frac{2a^2b}{a^2+b^2}y+c=0$$

D.

$$x^2+y^2+\frac{2ab^2}{a^2+b^2}x-\frac{2a^2b}{a^2+b^2}y+c=0$$

Answer: C

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46. If $(3, \lambda)$ and $(5, 6)$ are the conjugate points to the curve $x^2 + y^2 = 3$, then λ is

A. -1

B. 1

C. -2

D. 2

Answer: C

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47. The equation of the tangent from the point (0, 1) to the circle $x^2 + y^2 - 2x - 6y + 6 = 0$

A. $3(x^2 - y^2) + 4xy - 4x - 6y + 3 = 0$

B. $3y^2 + 4xy - 4x - 6y + 3 = 0$

C. $3x^2 + 4xy - 4x - 6y + 3 = 0$

D. $3(x^2 + y^2) + 4xy - 4x - 6y + 3 = 0$

Answer: B

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48. The real part of the principle value of 2^{-i} is

A. $\sin(\log 2)$

B. $\cos\left(\frac{1}{\log 2}\right)$

C. $\cos\left[\log\left(\frac{1}{2}\right)\right]$

D. $\cos(\log 2)$

Answer: C

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49. Two vertices of a triangle are $(-2, -1)$ and $(3, 2)$ and third vertex lies on the line $x + y = 5$. If the area of the triangle is 8 square units, then the third vertex is:

A. $(0, 5)$ or $(1, 4)$

B. $(5, 0)$ or $(4, 1)$

C. $(5, 0$ or $(1, 4)$

D. $(0, 5)$ or $(4, 1)$

Answer: C

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50. If $2a + b + 3c = 0$, then the line $ax + by + c = 0$ passes through the fixed point that is

A. $\left(\frac{2}{3}, \frac{1}{3}\right)$

B. $(0, 1)$

C. $\left(\frac{2}{3}, 0\right)$

D. None of these

Answer: A

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