MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

MOCK TEST PAPER -II

Select Correct Answer

1. 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. 0

B. 35

C. 45

D. 25

Answer: A

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2. Define a relation R on A = {1,2,3,4} as xRy iff x divides y. Then R is

.

A. reflexive and transitive

B. reflexive and symmetric

C. symmetric and transitive

D. equivalence

Answer: D

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3. 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. one - one nad onto

B. one- one but not onto

C. onto but not one- one

D. neither one -one nor onto.

Answer: B

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4. The group (Z+) has ....

A. exactly one subgroup

B. only two subgroups

C. no subgroup

D. infintely many subgrous

Answer: B

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5. the value of $\alpha(\neq 0)$ for which the function f(x) = 1+ ax is the inverse of itself is :

A. -2

B. 2

C. -1

D. 1

Answer: A

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6. if 3x =5 (mod) 7, then :

A. x=2 (mod 7)

B. x=3 (mod 7)

C. x=4(mod 7)

D. None of these

Answer: B

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7. If f(x) e^x and g(x) = log e^x then which of the following is TRUE ?

A. $f(g(x)) \neq g\{f(x)\}$

B. $f\{g(x)\} = g\{f(x)\}$

C. $f\{g(x)\} + g\{(x)\} = 0$

D. $f\{g(x)\} - g\{f(x)\} = 1$

Answer: B

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8. the number of bijeective funtion from the set A to itself. It a contains 108 elements is :

A. 108

B. -108

C. $(108)^2$

D. 2^{108}

Answer: A

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9. If $1, \varepsilon, \varepsilon^2$ are the cube roots of unity then : $\frac{1}{1+2\varepsilon}+\frac{1}{2+\varepsilon}-\frac{1}{1+\varepsilon}$

A. 0

B. 1

C. ε

D. ε^2

Answer: A

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10. The modulus and amplitude of $\frac{1+2i}{1-(1-i)^2}$ are

A. $1, \frac{\pi}{3}$

B. $\sqrt{2}\frac{\pi}{6}$

C. $1, 0$

D. $\sqrt{3}, 0$

Answer: C

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11. Sachin and Rahul ttempted to solve a quadratic equation .Sachin made a mistake in writing down the constant term and ended up in roots (4,3) Rahul made a mistake in wrinting down coefficent of X to get roots (3,2) the correct roots of equation are :

A. $6, 1$

B. $4, 3$

C. $-6, \ -1$

D. $-4, \ -3$

Answer: A

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12. If the equation :

$x^2 + 2x + 3 = 0$ and $ax^2 + bx + c = 0 a, b, c \in R$

have a common root then a: b: c is :

A. $3 : 2 : 1$

B. $1 : 3 : 2$

C. $3 : 1 : 2$

D. $1 : 2 : 3$

Answer: D

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13. Let α and β the roots of equation $px^2 + qx + \ = 0$

$p \neq 0$ if p,q,r are in A.P and $\frac{1}{\alpha} + \frac{1}{\beta} = 4$ then the value of

$|\alpha - \beta|$ is :

A. $\frac{2\sqrt{17}}{9}$

B. $\frac{\sqrt{34}}{9}$

C. $\frac{2\sqrt{13}}{9}$

D. $\frac{\sqrt{61}}{9}$

Answer: C

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14. If the coefficents of x^3 and x^4 in the expansion of $(1 + ax + bx^2)(1 - 2x)^{18}$ in powers of x and both zero then (a, b) is equal to

A. $\left(14, \frac{251}{3}\right)$

B. $\left(14, \frac{272}{3}\right)$

C. $\left(16, \frac{272}{3}\right)$

D. $\left(16, \frac{251}{3}\right)$

Answer: C

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15. If m is the A.M of two distinct real number l and n (l,n $>$ 1) and G_1, G_2 and G_3 are three geometric means between l and n, then $G_1^4 + 2G_2^4 + G_3^4$ equal :

A. $4l^2mn$

B. $4lm^2n$

C. $4lmn^2$

D. $4l^2m^2n^2$

Answer: B

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16. Let $P \equiv (-1, 0), Q \equiv (0, 0)$ and $R \equiv (3, 3\sqrt{3})$ be three points. The equation of the bisector of the angle PQR is

A. $\sqrt{3}x + y = 0$

B. $x + \sqrt{3y} = 0$

C. $\sqrt{3x} - y = 0$

D. $x - \sqrt{3}y = 0$

Answer: B

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17. If the focii of $\frac{x^2}{16} + \frac{y^2}{4} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{3}$=1 coincide, then value of a is

A. $\sqrt{3}$

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

C. 2

D. 3

Answer: D

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18. The mean of the data set somprising of 16 doeservatins is 16.If oen of the observation valued 16 is delected and three new observations valued 3,4 and 5 are added to the data then the mean of the resultant data is :

A. 16.8

B. 16

C. 15.8

D. 14

Answer: D

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

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

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

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

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

Answer: C

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20. The logical equivalent proposition of $p \Rightarrow q$ is

A. $(pAq)v(pAq)$

B. $(p \forall q) \vee (q \Rightarrow p)$

C. $(p \Rightarrow q) \vee (q \Rightarrow p)$

D. $(p \forall q) \Rightarrow (p \vee q)$

Answer: C

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21. If

$$\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4}\dots\right) + \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - \dots\right) = \frac{\pi}{2}$$

for $0 < |x| < \sqrt{2}$ then x equals :

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

B. 1

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

D. -1

Answer: A

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22. $\cot^{1}\sqrt{\cos\alpha}-\tan^{-1}\sqrt{\cos\alpha}=x$ then sin x

A. $\frac{\tan^{2}(\alpha)}{2}$

B. $\frac{\cot^{2}(\alpha)}{2}$

C. $\tan\alpha$

D. $\frac{\cot(\alpha)}{2}$

Answer: D

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23. If $\cos^{-1}x - \frac{\cos^{-1}(y)}{2} = \alpha$ then $4x^2 - 4xy\cos\alpha + y^3$ is equzal to

A. 4

B. $2\sin^2\alpha$

C. $-4\sin^2\alpha$

D. $4\sin^2\alpha$

Answer: D

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24. If $0 < x < 1$ then :

A. $\dfrac{x}{\sqrt{1+x^2}}$

B. x

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

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

Answer: B

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

B. $9x^2+q+b+c$

C. 0

D. $a+b+c$

Answer: A

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26. If $\begin{vmatrix} 2a & x_1 & y_1 \\ 2b & x_2 & y_2 \\ 2c & x_3 & y_3 \end{vmatrix} = \frac{abc}{2} \neq 0$, then the area of the triangle whose vertices are $\left(\frac{x_1}{a}, \frac{y_1}{a}\right), \left(\frac{x_2}{b}, \frac{y_2}{b}\right)$ and $\left(\frac{x_3}{c}, \frac{y_3}{c}\right)$

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

B. $\frac{1}{8}$abc

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

D. $\frac{1}{8}$

Answer: B

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27. The system of linear equation :

$x+y+z=6, x+2y+3z=10$ and $x+2y+az=6$ has no solutions when:

A. $a=2, b\neq 3$

B. $a=3, b\neq 10$

C. $b=2, a=3$

D. $b=3, a\neq 10$

Answer: C

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28. 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. 3×4

B. 3×3

C. 4×4

D. 4×3

Answer: B

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29. The symmetric part of the matrix

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

A. $\begin{pmatrix} 1 & 4 & 3 \\ 2 & 8 & 0 \\ 3 & 0 & 7 \end{pmatrix}$

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

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

D. $\begin{pmatrix} 0 & 2 & 1 \\ 2 & 0 & 2 \\ 1 & 2 & 0 \end{pmatrix}$

Answer: C

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

A (adj A) $= 10I$, then |adj A| $=$

A. 10

B. 101

C. 1

D. 100

Answer: A

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31. $\lim_{n \to p \text{ or } p} \frac{1^2 + 2^2 \dots\dots\dots + n^2 (n)^{1/n}}{(n+1)(n+10)(n+10)} =$

A. 3

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

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

D. ∞

Answer: D

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32. $\lim_{x \to 0} \frac{1 - \cos x}{x^2}$

A. 2

B. 3

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

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

Answer: D

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33. The derivative of $\tan^{-1}\left[\frac{\sin x}{1+\cos x}\right] w.r.t$ $\tan^{-1}\left[\frac{\cos x}{1+\sin x}\right]$ is

A. 2

B. -1

C. 0

D. -2

Answer: B

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34. $\frac{d}{dx}\left[\cos^2 \cot^{-1}\sqrt{\frac{2+x}{2-x}}\right]$ is :

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

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

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

D. $\frac{-3}{4}$

Answer: B

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35. If $f(x)=\frac{\sin^2 x}{1+\cot x}+\frac{\cos^2}{1+\tan x}$ then $f\left(\frac{\pi}{4}\right)$ is

A. $\sqrt{3}$

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

C. 0

D. $-\sqrt{3}$

Answer: A

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36. if $\cos^{-1}\left(\frac{y}{b}\right) = n\log\left(\frac{x}{n}\right)$, then

A. $y_1 = x\sqrt{b^2 - y^2} = 0$

B. $xy_1 - \sqrt{b^2 - y^2} = 0$

C. $xy_1 = n\sqrt{b^2 - y^2}$

D. $xy_1 + n\sqrt{b^2 - y^2} = 0$

Answer: D

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37. $f(x) = 2a - x$ in $-a < x < a = 3x - 2a$ in $a \leq x$. Then which of the following is true ?

A. f(x) is not differentiable at x= a

B. f(x) is continous at x=a

C. f(x) is continuous for all $x \leq a$

D. f(x) is differentiable for all x $\leq$ a

Answer: D

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38. If for the curve y=1 + $x^2$the tangent at $(1, \ -2)$ is parallel to x-axis then b=

A. 2

B. -2

C. 1

D. -1

Answer: D

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39. The slopes of the tangent normal at (0.1) for the curve y= sin sin x =e^x are respectively

A. 1 and -1

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

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

D. -1 and 1

Answer: B

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40. A stone is thrown vertically upwards and the height x ft, reached by the stone in t seconds is given by $x = 80t - 16t^2$. The stone reaches the maximum height in

A. 2 secs

B. 2.5 secs

C. 3secs

D. 3.5 secs

Answer: C

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41. If $\sin^{-1} a$ is the acture angle between the curves $x^2 + y^2 = 4x$ and $x^2 + y^2 = 8$ at (2,2), then a=

A. 1

B. 0

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

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

Answer: B

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42. 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) = 3x-5

B. g(x) =3+x

C. f(x) =3 (x-1)

D. g(x) =3(x-1)

Answer: A

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

A. $\log\left(1+\cos^2 x\right)+c$

B. $\log\left(1+\tan^2 x\right)+c$

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

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

Answer: B

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44. $\int\frac{x^2+1}{x^4+1}dx=$

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

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

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

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

Answer: A

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45. $\int_0^1 x(1-x)^{3/2} dx =$

A. $-\frac{8}{35}$

B. $\frac{24}{35}$

C. $\frac{4}{35}$

D. $\frac{2}{35}$

Answer: C

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46. $\int_0^{\pi/4} \frac{\sin x + \cos x}{3 + \sin 2x} dx =$

A. 2 log 3

B. $\frac{1}{2}\log 3$

C. log 3

D. $\frac{1}{4}\log 3.$

Answer: B

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47. If the are between y $= mx^2$ and x= $my^2 (m > 0)$ is $\frac{1}{4} sq.$ Unit then the value of m is:

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

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

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: B

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48. The order and degree of the differential equation :

$$\left[1+\left(\frac{dy}{dx}\right)^5\right]^{\frac{1}{3}}=\frac{d^2y}{dx^2}$$

A. $1, 3$

B. $2, 3$

C. 2,1

D. $1, 2$

Answer: B

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

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

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

C. $y = x\frac{c}{x}$

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

Answer: D

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50. The angle between two diagonals of a cube is

A. 30°

B. 45°

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

D. $\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)$

Answer: D

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51. 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=0

B. k=-1

C. k=2

D. k=3

Answer: D

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52. Equatin of line passing through the point (2,3,1) and parallel to the line of intersection of the planes x−2y−z+6=0 and x+y+3z=5 is

A. $\dfrac{x-2}{5}=\dfrac{y-3}{4}=\dfrac{z-1}{3}$

B. $\dfrac{x-2}{5}=\dfrac{y-3}{4}=\dfrac{z-1}{3}$

C. $\dfrac{x-2}{-5}=\dfrac{y-3}{-4}=\dfrac{z-1}{3}$

D. $\dfrac{x-2}{4}=\dfrac{y-3}{3}=\dfrac{z-1}{2}$

Answer: C

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53. Let $\overrightarrow{a}=\hat{i}-2\hat{j}+3\hat{k}$. If $\overrightarrow{b}$ is a vector such that $\overrightarrow{a}.\overrightarrow{b}=\left|\overrightarrow{b}\right|^2$ and $\left|\overrightarrow{a}-\overrightarrow{b}\right|$ and $\left|\overrightarrow{a}-\overrightarrow{b}\right|=\sqrt{7}$, then $\left|\overrightarrow{b}\right|$ =

______

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

B. 15

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

D. $\frac{15\sqrt{3}}{2}$

Answer: C

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54. Let $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$. If $\vec{b}$ is a vector such that $\vec{a} . \vec{b} = \left|\vec{b}\right|^2$ and $\left|\vec{a} - \vec{b}\right|$ and $\left|\vec{a} - \vec{b}\right| = \sqrt{7}$, then $\left|\vec{b}\right|$ =

______

A. 7

B. 14

C. $\sqrt{7}$

D. 21

Answer: C

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55. If direction cosines of a vector of magnitude 3 are $\frac{2}{3}, -\frac{9}{3}, \frac{2}{3}$ and $a > 0$, then vector is ______

A. $2\hat{j} + \hat{j} + 2\hat{k}$

B. $2\hat{j} - \hat{j} + 2\widehat{k0}$

C. $\hat{i} + 2\hat{j} + 2\hat{k}$

D. $\hat{i} + 2\hat{j} + 2\hat{k}$

Answer: A

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56. If two dice are thrown simultaneously , then the probability that the sum of the numbers which come up on the dice to be more than 5 is ______

A. $\frac{5}{36}$

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

C. $\frac{5}{18}$

D. $\frac{13}{18}$

Answer: C

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57. A man takes a step forward with probability 0.4 and one step backward with probability 0.6 , then the probability that at the end of eleven steps he is one step away form the starting point , is

A. $.^{11}C_5 \times (0.48)^5$

B. $.^{11}C_6 \times (0.24)^5$

C. $.^{11}C_5 \times (0.12)^5$

D. $.^{11}C_6 \times (0.72)^6$

Answer: B

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58. The probability distribution of X is : $\begin{cases} X: & 0 & 1 & 2 & 3 \\ P(X) & 0.2 & k & k & 2k \end{cases}$

find the value of k.

A. 0.2

B. 0.3

C. 0.4

D. 0.1

Answer: C

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59. A box contains o red marbles number from 1 through 6 and 4 white marbles 12 through 15 .Find the probability that a marble drawn at random is white and old number :

A. 5

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

C. 6

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

Answer: C

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60. An urn contains nine balls of which three are ed four are blue two are green . Three balls are drawn at random without replacement from the urn the probability that the three balls have different colours is :

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

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

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

D. $\frac{2}{23}$

Answer: B

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Select The Correct Answer

1. Let A and B be two sets containing four and two elements respectively tehn the number of subsets of the set $A \times B$ each having at least three elements is

A. 219

B. 256

C. 275

D. 510

Answer: A

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2. 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. relexive an transitive but not symmetric

B. an equivalence relation

C. symmetric and transitive but not reflexive

D. reflexive and symmetric but not transitiv

Answer: D

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

B. $\sqrt{x}-1$

C. $\frac{1}{(x-1)^2}>-1$

D. $\sqrt{x}+1$

Answer: B

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4. A real valued functio f(x) satisfies the functional equation

f(x-y)=f(y)-f(a-x)f(a+y)

where a is given constant and f(0) =1 f(2a-x) is equal to

A. f(x)

B. $-f(x)$

C. f(-x)

D. f(a)+f(a-x)

Answer: B

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5. If (x) $\begin{cases} x & x \in Q \\ 0 & x \neq Q \end{cases}$ and g(x)=$\begin{cases} x & x \in Q \\ 0 & x \in Q \end{cases}$ then (f-g) will be

A. one one onto

B. one-one into

C. many one onto

D. many one into

Answer: A

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6. If x and y are two non exptys sets where $f: X \rightarrow Y$ is function defined such that $f(C) = \{f(x) : x \in C\}$ and f (d)=(x:f(x) in D}

f or $D \supseteq Y$ for any $A \supseteq X$ and B supeY` then

A. $f\left(f^{-1}(B)\right)$=B only if B =f(x)

B. $f\left(f^{-1}(B)\right)$=B only if B $\subset f(X)$

C. $f\left(f^{-1}\right)(B)\big)$= only if $B \subseteq f(x)$

D. $f\left(f^{-1}(B)\right)$ never equals B

Answer: B

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7. The largest interval lying in $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ for which the function

f(x)=$\left[4^{-x^2+\cos^{-1}\left(\frac{x}{2}-1\right)+\log(\cos x)}\right.$ is defined is :

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

B. $-\frac{\pi}{4}, \frac{\pi}{2}$

C. $0, \frac{\pi}{2}$

D. $[0, \pi]$

Answer: C

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8. Prove that the funciton $f: R \to R$ defined by f(x)=4x+3 is invertible and find the inverse of f.

A. $g(y) = \frac{y-3}{4}$

B. $g(y) = \frac{3y+4}{3}$

C. $g(y) = 4 + \frac{y+3}{4}$

D. $g(y) = \frac{y+3}{4}$

Answer: A

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9. If z is a complex number such that |z| $>$ 2 then the minimum value of $\left|z + \frac{1}{2}\right|$

A. lies in the interval $(1, 2)$

B. is strictly greater than $\frac{5}{2}$

C. is strictly greater than $\frac{3}{2}$ but less than $\frac{5}{2}$

D. is equal to $\frac{5}{2}$

Answer: A

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10. A complex number z is said to be unimodular if |z| =1 suppose z_1 and z_2 are complex numebers such that $\frac{z_1 - 2z_2}{2 - z_1 z_2}$ is unimodular and z_2 is not unimodular then the point z_1 lies on a

A. straight line parallel to x axis

B. straight line paralle to y axis

C. circle of radius 2

D. circle of radius $\sqrt{2}$

Answer: C

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11. Let a,b,c be the sides of a triangle no two of them are equal and $\lambda \in R$ if the roots of the equation $x^2 + 2(a + b + c) + 3\lambda$ (ab+bc+ca=0) are real then

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

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

C. $\lambda \in \left(\frac{1}{3}, \frac{5}{3}\right)$

D. $\lambda \in \left(\frac{4}{3}, \frac{5}{3}\right)$

Answer: A

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12. Let α, β be the roots of the equation $x^2 - px + r = 0$ and $\frac{\alpha}{2}, 2\beta$ be the roots of the equation $x^2 - qx + r = 0$ then the value of r is

A. $\frac{2}{9}(p-q)(2q-p)$

B. $\frac{2}{9}(q-p)(2p-q)$

C. $\frac{2}{9}(q-2p)(2q-p)$

D. $\frac{2}{9}(2p-q)(2q-p)$

Answer: D

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13. If the roots of the equation $bx^2+cx+a=0$ be imaginary then fro all real value4s of x the expression $3b^2x^2+6bcx+2c^2$ is

A. greater than 4ab

B. less than 4ab

C. greater than -4ab

D. less than -ab

Answer: C

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14. The sum of coefficients of integral powers of x in the binominal expansion of $\left(1 - 2\sqrt{x}^{50}\right)$ is

A. $\frac{1}{2}\left(3^{50}+1\right)$

B. $\frac{1}{2}\left(3^{50}\right)$

C. $\frac{1}{2}\left(3^{50-1}\right.$

D. $\frac{1}{2}\left(2^{50}+1\right)$

Answer: A

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15. If

$(10)^9 + 2(11)^1 + (10)^8 + 3(11)^2(10)^7 + \ldots + 10(11)^9 = k(10)^9$

then k is equal to

A. $\frac{441}{100}$

B. 100

C. 110

D. $\frac{121}{10}$

Answer: B

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

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

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

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

Answer: B

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17. The equation of a hyperbola whose asymtotes are 3x $\pm$ 5y=0 and vertices are $(\pm 5, 0)$ is

A. $3x^2 - 5y^2 = 0$

B. $5x^2 - 3y^2 = 25$

C. $25x^2 - 9y^2 = 225$

D. $9x^2 - 25y^2 = 225$

Answer: D

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18. All the students of a class performed poolrly in mathematics which of the following statistical measures will not change evern after the grace marks were given

A. median

B. mode

C. variance

D. mean

Answer: C

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19. Let $f_k(x) = \frac{1}{k}\left(\sin^k x + \cos^k x\right)$ where $x \in R$ and $k \geq 1$ then $f_4(x) - f_6(x)$ equals

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

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

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

D. $\frac{1}{16}$

Answer: C

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20. Let p be the proposition. Mathematics is interesting and let q be the proposition mathematics is difficult, then the symbol $p \cap q$ means

A. mathematics is intersecting implies that mathematics is difficult

B. mathematics is intersecting implies and is implied by mathematics is difficult

C. mathematics is intersecting and mathematics is difficult

D. mathematics is intersecting or mathematics is difficult

Answer: C

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21. Value of $\frac{\tan^{-1} 1}{3} + \frac{\tan^{-1} 1}{5} + \frac{\tan^{-1} 1}{7} + \frac{\tan^{-1} 1}{8}$ is

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

B. $\frac{3\pi}{4}$

C. $\pi)$

D. none of these

Answer: A

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22. If $\frac{\tan^{-1}\left(\sqrt{1+x^2}-1\right)}{x}=4$ then x equals

A. tan 2

B. tan 4

C. tan 6

D. tan 8

Answer: D

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23. The integral solution of $\tan^{-1}x + \dfrac{\tan^{-1}(1)}{y} = \tan^{-1}3$ is

A. (1,4)

B. (2,1)

C. (3,13)

D. none of these

Answer: D

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24. If $\sin^{-1}x + \cos^{-1}(1-x) = \sin^{-1}(-x)$ then x satisfies

A. $2x^2 + 3x + 1 = 0$

B. $2x^2 - 3x = 0$

C. $2x^2 + x - 1 = 0$

D. $2x^2 + x + 1 = -0$

Answer: B

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25. The number of values of k for which the system of equations :

$(k+1)x + 8y = 4k$

$kx + (k+3)y = 3k - 1$

has no solution is:

A. 1

B. 2

C. 3

D. infinite

Answer: C

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26. If $\alpha, \beta \neq 0$ and $f(n) = \alpha^n + \beta^n$ and

$$\begin{vmatrix} 3 & 1+f(1) & 1+f(2) \\ 1+f(1) & 1+f(2) & 1+f(3) \\ 1+f(2) & 1+f(3) & 1+f(4) \end{vmatrix}$$

$= k(1-\alpha)^2(1-\beta)^2(\alpha-\beta)^2$ then k is equal to

A. $\dfrac{1}{\alpha\beta}$

B. 1

C. -1

D. $\alpha\beta$

Answer: B

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27. The set of all values of λ for which the system of linear equation |(2x_(1)-2x_(2)+x_(3),=lambdax_(1)), (2x_(1)-3x_(2)+2x_(3),=lambdax_(2)),(-x(1)+2x_(2),=lambdax_(3))|` has a non trivial solution

A. is an empty set

B. is a singleton

C. contains two elements

D. contains more than two elements

Answer: C

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

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

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

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

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

Answer: B

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29. If A= $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ then A^n is

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

B. $\begin{bmatrix} 1 & n^2 \\ 0 & 1 \end{bmatrix}$

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

D. $\begin{bmatrix} 1 & n^2 \\ 1 & 1 \end{bmatrix}$

Answer: C

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30. If $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ then A^2 is equal to ______

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

B. $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$

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

D. $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$

Answer: A

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31. The function $f(x) = [x]$ where $[x]$ is the greatest integer function is continous at

A. 4

B. -2

C. 1

D. 1.5

Answer: D

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32. $f(x) = \begin{cases} 3x - 8 & \text{if} x \leq 5 \\ 2k & \text{if} x > 5 \end{cases}$

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

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

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

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

Answer: D

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33. If x+y=$\tan^{-1} y$ and $\frac{d^2y}{dx^2} = f(y)\frac{dy}{dx}$ then f(y)=

A. $-\frac{2}{y^3}$

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

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

D. $-\frac{1}{y}$

Answer: B

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34. Let $f(x) = \cos^{-1}\left[\frac{1}{\sqrt{13}}(2\cos x - 3\sin x)\right]$. Then f(0.5) =

A. 0.5

B. 1

C. 0

D. -1

Answer: B

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

A. 28

B. 0

C. 20

D. 1

Answer: A

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36. If $y=(\tan^{-1}x)^2$ then show that

$$(x^2+1)^2\frac{d^2y}{dx^2}+2x(x^2+1)\frac{dy}{dx}=2$$

A. 0

B. 1

C. 4

D. 2

Answer: D

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37. 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. 100

B. -1

C. $100f(0)$

D. 1

Answer: D

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38. The maximum area of rectangle that can be inscribed in a circle of radius 2 units is

A. 8π sq units

B. 4 sq units

C. 5 sq units

D. 8 sq units

Answer: B

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39. 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. $8xc\frac{m^2}{s}$

B. $80\pi c\frac{m^2}{s}$

C. $6\pi c\frac{m^2}{s}$

D. $\frac{8}{3}c\frac{m^2}{s}$

Answer: B

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40. 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. 10 minutes

B. 40 minutes

C. 100 minutes

D. 30 minutes

Answer: C

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41. If f(x)=x^3 and g(x)=$x^3 - 4x$ in $-2 < x < 2$ then consider the statements

(a) f(x) and g(x) satisfy mean value theorem

(b) f(x) and g(x) both satisfy rolle 's theorm

(c) only g(x) satisfies rolle 's theorem

OF THE STATEMENTS

A. a alone is correct

B. a and c are correct

C. a and b are correct

D. none is correct

Answer: B

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42. $\int \frac{1}{x^2(x^4+1)^{3/4}} dx$ is equal to __________.

A. $\frac{-(+x^4)^{1/4}}{x} + C$

B. $\frac{-(+x^4)^{1/4}}{x^2} + C$

C. $\frac{-(+x^4)^{1/4}}{2x} + C$

D. $\frac{-(+x^4)^{3/4}}{x} + C$

Answer: A

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43. $\in \frac{\sin^2 x}{1+\cos x}$ dx=

A. x+ sin x+C

B. x-sin x+C

C. sin x+C

D. cos x +C

Answer: B

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44. $\int e^x \frac{1+\sin x}{1+\cos x}$ dx is equal to

A. $e^x \frac{\tan(x)}{2} + c$

B. $\frac{\tan(x)}{2} + C$

C. $e^x + C$

D. $e^x \sin x + C$

Answer: A

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45. The value of $\int_{-1}^{2} \frac{|x|}{x}$ dx is

A. 0

B. 1

C. 2

D. 3

Answer: B

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46. $\int_{0}^{\frac{\pi}{2}} \frac{\cos^4 x}{\cos^4 x + \sin^4 x}$ dx =

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

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

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

D. (π)

Answer: A

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47. The area bounded by the curve $y = \sin\left(\frac{x}{3}\right)$, x-axis and lines x=0 and $x = 3\pi$ is

A. 9

B. 0

C. 6

D. 3

Answer: C

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48. The particular solution of $\frac{y}{x}\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ when x=1 y=2 is

A. $5(1+y^2) = 2(1+x^2)$

B. $2(1+y^2) = 5(1+x^2)$

C. $5(1+y^2) = (1+x^2)$

D. $(1+y^2) = 2(1+x^2)$

Answer: B

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49. The solution of the differential equation $\frac{dy}{dx} = (x+y)^2$ is

A. $\frac{1}{x+y} = c$

B. $\sin^{-1}(x+y) = x + c$

C. $\tan^{-1}(x+y) = c$

D. $\tan^{-1}(x+y) = x + c$

Answer: D

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50. The angle between the lines whose direction cosines satisfy the equation $l + m + n = 0$ and $l^2 = m^2 + n^2$ is

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

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

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

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

Answer: D

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51. The distance of the point (1,0,2) from the point of intersection of the line $\frac{x-2}{3}=\frac{y+1}{4}=\frac{z-2}{12}$ and the plane x-y+z=16 is

A. $2\sqrt{14}$

B. 8

C. $3\sqrt{21}$

D. 13

Answer: D

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52. The equatin of the plane containing the line 2x-5y+z=3,x+y+4z=5 and parallel to the plane x +3y+6z=1 is

A. 2x+6y+12z=13

B. x+3y+6z=-7

C. x+3y+6z=7

D. 2x+6y-12z=-13

Answer: C

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53. Let $\overrightarrow{P}R = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\overrightarrow{S}Q = \hat{i} - 3\hat{j} - 4\hat{k}$ determine diagonals of a parallelogram PQRS and $\overrightarrow{P}T = \hat{i} + 2\hat{j} + 3\hat{k}$ be another vector the volume of the paralleopiped determined by the vectors $\overrightarrow{P}T, \overrightarrow{P}Q$ and $\overrightarrow{P}S$ is

A. 5

B. 20

C. 10

D. 30

Answer: C

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54. If $\left[\bar{a}\times\bar{b}\bar{b}\times\bar{c}\bar{c}\times\bar{a}\right]=\lambda\left[\bar{a}\bar{b}\bar{c}\right]^{2}$ then λ is equal to

A. 3

B. 0

C. 1

D. 2

Answer: C

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55. Let $\overrightarrow{a}, \overrightarrow{b}$ and $\overrightarrow{c}$ be three non zero vectors such that no two of them are collinear and $\left(\overrightarrow{a} \times \overrightarrow{b}\right) \times \overrightarrow{c} = \frac{1}{3}\left|\overrightarrow{b}\right|\left|\overrightarrow{c}\right|\overrightarrow{a}$ if θ the angle between the vectors $\overrightarrow{b}$ and $\overrightarrow{c}$ then a value of $\sin\theta$ is

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

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

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

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

Answer: A

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56. 6 boys and 6 girls sit in a row at random the probability that all the girls sit together is

A. $\frac{1}{432}$

B. $\frac{12}{431}$

C. $\frac{1}{132}$

D. none of these

Answer: C

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57. An urn contains 9 balls , 2 of which are white, 3 blue and 4 black. 3 balls are drawn at random from the urn. The chance that 2 balls will be of the same colour and the third of a different colour is:

A. $\frac{45}{84}$

B. $\frac{55}{84}$

C. $\frac{35}{84}$

D. $\frac{25}{84}$

Answer: B

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58. Three dice are rolled once the chance of getting a score of 5 is

A. $\frac{5}{216}$

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

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

D. $\frac{1}{7^2}$

Answer: C

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59. A bag contaings 3 white 4 black 2 red balls if 2 balls are drawn at random then the probability that both the balls are white is

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

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

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

D. $\frac{1}{24}$

Answer: C

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60. An urn contains nine balls of which three are red four are blue and two are green three balls are drawn at random the probability that the three balls different colours is

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

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

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

D. $\frac{2}{23}$

Answer: B

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