Engineering Maths Daily Quiz # 1

1. Linear Algebra

1. If $A = \begin{bmatrix} 2 & -1 & 3 \\ -4 & 5 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & -2 \\ 1 & 5 \end{bmatrix}$, then _____.

   A. only AB is defined

   B. only BA is defined

   C. AB and BA both are defined

   D. AB and BA both are not defined.

Engineering Maths Daily Quiz # 2

2. If matrix A is $m \times n$ and B is $n \times p$, the number of multiplication operations and addition operations needed to calculate the matrix AB, respectively, are

A. mn^2p, mpm

B. $mpn, mp(n-1)$

C. mpn, mpn

D. $mn^2p, (m+p)n$

Engineering Maths Daily Quiz # 3

3. Total number of possible matrices of order 3×3 with each entry 2 or 0 is _____.

A. 9

B. 27

C. 81

D. 512

Engineering Maths Daily Quiz # 4

4. A is a matrix of of order $m * n$, then number of minors of order r is _____.

   A. ${}^{m}\mathrm{P}_{r}$

   B. ${}^{m}\mathrm{C}_{r} * {}^{n}\mathrm{C}_{r}$

   C. $m * n$

   D. None

Engineering Maths Daily Quiz # 5

5. Let $A = \begin{bmatrix} 1 & 1/3 \\ c & d \end{bmatrix}$.

If $A^2 = -I$, then the value of $c - d$ is _____.

Engineering Maths Daily Quiz # 6

6. The total number of matrices $A = \begin{bmatrix} 0 & 2y & 1 \\ 2x & y & -1 \\ 2x & -y & 1 \end{bmatrix}$, $(x, y \in R, x \neq y)$ for which $A^T A = 3I_3$ is _____.

A. 2

B. 4

C. 3

D. 6

Engineering Maths Daily Quiz # 7

7. Let $A = \begin{bmatrix} 0 & 2q & r \\ p & q & -r \\ p & -q & r \end{bmatrix}$. If $AA^T = I_3$, then $|p|$ is _____.

A. $\frac{1}{\sqrt{5}}$

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

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

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

Engineering Maths Daily Quiz # 8

8. For 3×3 matrices M and N, which of the following statement(s) is/are not correct? (Mark all the correct options)

   A. $N^T MN$ is symmetric or skew-symmetric, according to M is symmetric or skew-symmetric.

   B. $MN - NM$ is symmetric for all symmetric matrices M and N.

   C. MN is symmetric for all symmetric matrices M and N.

   D. $(\operatorname{adj} M)(\operatorname{adj} N) = \operatorname{adj}(MN)$ for all invertible matrices M and N.

Engineering Maths Daily Quiz # 9

9. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$ is a matrix satisfying the equation $AA^T = 9I$, where, I is 3×3 identity matrix, then the ordered pair (a, b) is equal to _____.

A. $(2, -1)$

B. $(-2, 1)$

C. $(2, 1)$

D. $(-2, -1)$

Engineering Maths Daily Quiz # 10

10. If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$, then value of α for which $A^2 = B$, is _____.

A. 1

B. -1

C. 4

D. no real values

Engineering Maths Daily Quiz # 11

11. Let

$$B = \begin{bmatrix} 8 & x & 0 \\ 4 & 0 & 2 \\ 12 & 6 & 0 \end{bmatrix}$$

For what value of x, B will be a singular matrix?

A. 4

B. 6

C. 8

D. 12

Engineering Maths Daily Quiz # 12

12. The sum of the real roots of the equation $\begin{vmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{vmatrix} = 0$, is equal to _____.

A. 0

B. 6

C. -4

D. 1

Engineering Maths Daily Quiz # 13

13. Let the numbers $2, b, c$ be in an AP and $A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & b & c \\ 4 & b^2 & c^2 \end{bmatrix}$.

If $\det(A) \in [2, 16]$, then c lies in the interval _____.

A. $[3, 2 + 2^{3/4}]$

B. $(2 + 2^{3/4}$

C. $[4, 6]$

D. $[2, 3)$

Engineering Maths Daily Quiz # 14

14. Let $A = \begin{bmatrix} 2 & b & 1 \\ b & b^2+1 & b \\ 1 & b & 2 \end{bmatrix}$, where $b > 0$. Then, the minimum value of $\frac{\det(A)}{b}$ is _____.

A. $-\sqrt{3}$

B. $-2\sqrt{3}$

C. $2\sqrt{3}$

D. $\sqrt{3}$

Engineering Maths Daily Quiz # 15

15. 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. $\alpha\beta$

B. $\frac{1}{\alpha\beta}$

C. 1

D. -1

Engineering Maths Daily Quiz # 16

16. Let $P = [a_{ij}]$ be a 3×3 matrix and let $Q = [b_{ij}]$, where $b_{ij} = 2^{i+j} a_{ij}$ for $1 \leq i, j \leq 3$. If the determinant of P is 2, then the determinant of the matrix Q is _____.

A. 2^{10}

B. 2^{11}

C. 2^{12}

D. 2^{13}

Engineering Maths Daily Quiz # 17

17. The determinant $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix} = 0$, if

A. x, y, z are in AP

B. x, y, z are in GP

C. x, y, z are in HP

D. xy, yz, zx are in AP

Engineering Maths Daily Quiz # 18

18. Given "Vandermonde matrix":

$$A = \begin{bmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{bmatrix}$$

What is the det(A)? (Mark all the appropriate options)

A. $(b-a)(c-a)(c-b)$

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

C. $(b-a)(a-c)(b-c)$

D. $(b-a)(c-a)(b-c)$

Engineering Maths Daily Quiz # 19

19. Suppose a 4 by 4 matrix has the same entry $\times$ throughout its first row and column. The other 9 numbers could be anything like 1, 5, 7, 2, 3, 99, $\pi, e, 4$.

$$A = \begin{bmatrix} \times & \times & \times & \times \\ \times & \text{any numbers} & & \\ \times & \text{any numbers} & & \\ \times & \text{any numbers} & & \end{bmatrix}$$

The determinant of A is a polynomial in $\times$. What is the largest possible degree of that polynomial?

A. 2

B. 3

C. 1

D. 4

Engineering Maths Daily Quiz # 20

20. Suppose a 4 by 4 matrix has the same entry $\times$ throughout its first row and column. The other 9 numbers could be anything like 1, 5, 7, 2, 3, 99, $\pi, e, 4$.

$$A = \begin{bmatrix} \times & \times & \times & \times \\ \times & \text{any numbers} & & \\ \times & \text{any numbers} & & \\ \times & \text{any numbers} & & \end{bmatrix}$$

If those 9 numbers give the identity matrix I, then which values of $\times$ give $\det A = 0$? (Mark all the appropriate options)

$$A = \begin{bmatrix} \times & \times & \times & \times \\ \times & 1 & 0 & 0 \\ \times & 0 & 1 & 0 \\ \times & 0 & 0 & 1 \end{bmatrix}$$

A. $\times = 0$ and $\times = \frac{1}{3}$

B. $\times = -1$ and $\times = \frac{1}{3}$

C. $\times = 0$ or $\times = \frac{1}{3}$

D. $\times = 0$ or $\times = \frac{-1}{3}$

Engineering Maths Daily Quiz # 21

21. If $B = \begin{bmatrix} 5 & 2\alpha & 1 \\ 0 & 2 & 1 \\ \alpha & 3 & -1 \end{bmatrix}$ is the inverse of a 3×3 matrix A, then the sum of all values of α for which $\det(A) + 1 = 0$, is _____.

A. 0

B. -1

C. 1

D. 2

Engineering Maths Daily Quiz # 22

22. Let A and B be two invertible matrices of order 3×3. If $\det\left(ABA^T\right) = 8$ and $\det\left(AB^{-1}\right) = 8$, then $\det\left(BA^{-1}B^T\right)$ is equal to _____.

A. 1

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

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

D. 16

Engineering Maths Daily Quiz # 23

23. If $A = \begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix}$, then adj $\left(3A^2 + 12A\right)$ is equal to _____.

A. $\begin{bmatrix} 72 & -84 \\ -63 & 51 \end{bmatrix}$

B. $\begin{bmatrix} 51 & 84 \\ 63 & 72 \end{bmatrix}$

C. $\begin{bmatrix} 51 & 63 \\ 84 & 72 \end{bmatrix}$

D. $\begin{bmatrix} 72 & -63 \\ -84 & 51 \end{bmatrix}$

Engineering Maths Daily Quiz # 24

24. Let M be a 2×2 symmetric matrix with integer entries. Then, M is invertible, if _____. (Mark all the appropriate choices)

A. the first column of M is the transpose of the second row of M

B. the second row of M is the transpose of the first column of M

C. M is a diagonal matrix with non-zero entries in the main diagonal

D. the product of entries in the main diagonal of M is not the square of an integer

Engineering Maths Daily Quiz # 25

25. If the adjoint of a 3×3 matrix P is $\begin{bmatrix} 1 & 4 & 4 \\ 2 & 1 & 7 \\ 1 & 1 & 3 \end{bmatrix}$, then the possible value(s) of the determinant of P is/are _____. (Mark all the appropriate choices)

A. -2

B. -1

C. 1

D. 2

Engineering Maths Daily Quiz # 26

26. **(Numerical Answer Type)** In the given matrix A, if the number of minors of order 3 is α, the number of minors of order 2 is β, and the number of minors of order 1 is γ, then the value of $\alpha + \beta + \gamma$ is _____.

$$A = \begin{pmatrix} 1 & 0 & 2 & 1 \\ 0 & 2 & 4 & 2 \\ 0 & 2 & 2 & 1 \end{pmatrix}$$

Engineering Maths Daily Quiz # 27

27. **(Numerical Answer Type)** If the rank of the matrix

$$A = \begin{pmatrix} 1 & 0 & 2 & 1 \\ 0 & 2 & 4 & 2 \\ 0 & 2 & 2 & 1 \end{pmatrix}$$

is α, then the value of $\alpha!$ is _____.

Engineering Maths Daily Quiz # 28

28. **(Numerical Answer Type)** If the rank of the following matrix:

$$\begin{bmatrix} 0 & 16 & 8 & 4 \\ 2 & 4 & 8 & 16 \\ 16 & 8 & 4 & 2 \\ 4 & 8 & 16 & 2 \end{bmatrix}$$

is β, then the value of $\beta^{0!+1!+2!}$ is _____.

Engineering Maths Daily Quiz # 29

29. **(Numerical Answer Type)** If the rank of the following matrix:

$$\begin{bmatrix} 4 & -6 & 0 \\ -6 & 0 & 1 \\ 0 & 9 & -1 \\ 0 & 1 & 4 \end{bmatrix}$$

is γ, then the value of $\underbrace{\gamma! + (\gamma+1)! + \ldots}_{\gamma \text{ times}}$ is _____.

Engineering Maths Daily Quiz # 30

30. The value of q gives A a different rank compared to all other values of q.

$$A = \begin{bmatrix} 1 & 2 & 3 & 1 \\ 2 & -1 & 3 & 4 \\ 4 & 3 & 9 & q \end{bmatrix}$$

Which of the following is/are correct? (Mark all the appropriate choices)

A. If $q = 6$, then rank(A) $= 2$

B. If $q \neq 6$, then rank(A) $= 3$

C. If $q = 6$, then rank(A) $= 3$

D. If $q \neq 6$, then rank(A) $= 2$

Engineering Maths Daily Quiz # 31

31. Which of the following is correct? (Mark all the appropriate choices)

A. Elementary row and column operations do not change the rank of a matrix.

B. The rank of a matrix A, denoted as "rank(A)," is always a non-negative integer. In other words, rank(A) ≥ 0 for any matrix A.

C. The rank of a matrix A is equal to the rank of its transpose, i.e., $\text{rank}(A) = \text{rank}\left(A^T\right)$.

D. For two matrices $A(m \times n)$ and $B(n \times p)$, the rank of their product AB is at most the minimum of the ranks of A and B, i.e., $\text{rank}(AB) \leq \min(\text{rank}(A), \text{rank}(B))$.

Engineering Maths Daily Quiz # 32

32. **(Numerical Answer Type)** Consider the 10×10 matrix M for which the entry in the ith row and j^{th} column is $i + j$.

If the rank of the matrix M is ρ, then $2024 \times \rho!$ is equal to _____.

Engineering Maths Daily Quiz # 33

33. **(Numerical Answer Type)** Let $v_1, \ldots, v_n \in \mathbb{R}^m$ be a collection of vectors. The Gram matrix of this collection is defined to be the n-by- n matrix whose entry in the ith row and j^{th} column is $a_{ij} = v_i \cdot v_j$, where $\cdot$ denotes the dot product.

Consider the **Gram matrix G** of the collection:

$$v_1 = (1, 2, 1)$$
$$v_2 = (-3, 5, 1)$$
$$v_3 = (0, -3, 6)$$
$$v_4 = (4, -2, 0).$$

If the rank of G is κ, then $\kappa^{(\kappa!)}$ is equal to _____.

Engineering Maths Daily Quiz # 34

34. **(Numerical Answer Type)** Given the matrix $A = \begin{bmatrix} 2 & 1 & 2 \\ 1 & 3 & 1 \\ 2 & 1 & -6 \end{bmatrix}$ If the sum of the eigenvalues is α and product of the eigen value is β, then the value of $\alpha - \beta =$ _____.

Engineering Maths Daily Quiz # 35

35. The eigenvalues of

$$\begin{bmatrix} 5 & 6 & 17 \\ 0 & -19 & 23 \\ 0 & 0 & 37 \end{bmatrix}$$

are

A. $-19, 5, 37$

B. $19, -5, -37$

C. $2, -3, 7$

D. $3, -5, 37$

Engineering Maths Daily Quiz # 36

36. The eigenvalues of the following matrix

$$\begin{bmatrix} 3 & 2 & 9 \\ 7 & 5 & 13 \\ 6 & 17 & 19 \end{bmatrix}$$

are given by solving the cubic equation?

A. $\lambda^3 - 27\lambda^2 + 167\lambda - 285 = 0$

B. $\lambda^3 - 27\lambda^2 - 122\lambda - 313 = 0$

C. $\lambda^3 + 27\lambda^2 + 167\lambda + 285 = 0$

D. $\lambda^3 + 23.23\lambda^2 - 158.3\lambda + 313 = 0$

Engineering Maths Daily Quiz # 37

37. The eigenvalues of a 4×4 matrix $[A]$ are given as $2, -3, 13$, and 7. The $|\det(A)|$ then is _____.

A. 546

B. 19

C. 25

D. cannot be determined

Engineering Maths Daily Quiz # 38

38. If one of the eigenvalues of $[A]_{n\times n}$ is zero, it implies

A. The solution to $[A][X] = [C]$ system of equations is unique

B. The determinant of $[A]$ is zero

C. The solution to $[A][X] = [0]$ system of equations is trivial

D. The determinant of $[A]$ is nonzero

Engineering Maths Daily Quiz # 39

39. If $\begin{bmatrix} -4.5 \\ -4 \\ 1 \end{bmatrix}$ is an eigenvector of $\begin{bmatrix} 8 & -4 & 2 \\ 4 & 0 & 2 \\ 0 & -2 & -4 \end{bmatrix}$, the eigenvalue corresponding to the eigenvector is _____.

A. 1

B. 4

C. -4.5

D. 6

Engineering Maths Daily Quiz # 40

40. Given that matrix $[A] = \begin{bmatrix} 8 & -4 & 2 \\ 4 & 0 & 2 \\ 0 & -2 & -3 \end{bmatrix}$ has an eigenvalue value of 4 with the corresponding eigenvectors of $[x] = \begin{bmatrix} -4.5 \\ -4 \\ 1 \end{bmatrix}$, then $[A]^5[X]$ is _____.

A. $\begin{bmatrix} -18 \\ -16 \\ 4 \end{bmatrix}$

B. $\begin{bmatrix} -4.5 \\ -4 \\ 1 \end{bmatrix}$

C. $\begin{bmatrix} -4608 \\ -4096 \\ 1024 \end{bmatrix}$

D. $\begin{bmatrix} -0.004395 \\ -0.003906 \\ 0.0009766 \end{bmatrix}$

Engineering Maths Daily Quiz # 41

41. Suppose the matrix $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ has an eigenvalue 1 with associated eigenvector $x = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$. What is A^{50}?

A. $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

B. $\begin{bmatrix} a^{50} & b^{50} \\ c^{50} & d^{50} \end{bmatrix}$

C. $\begin{bmatrix} 2 \\ 3 \end{bmatrix}$

D. $\begin{bmatrix} 2^{50} \\ 3^{50} \end{bmatrix}$

Engineering Maths Daily Quiz # 42

42. Let A and B be the 2×2 matrices

$$A = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$$

Which of the following statements is most accurate?

A. Neither A nor B is diagonalizable.

B. Both A and B are diagonalizable.

C. A is diagonalizable but B is not.

D. B is diagonalizable but A is not.

Engineering Maths Daily Quiz # 43

43. **(Numerical Answer Type)** Consider the 3×3 matrix

$$A = \begin{bmatrix} a & b & c \\ 1 & d & e \\ 0 & 1 & f \end{bmatrix}$$

If

- the top left 1×1 block is a matrix with eigenvalue 2 ;
- the top left 2×2 block is a matrix with eigenvalue 3 and -3;
- the top left 3×3 block is a matrix with eigenvalue 0,1 and -2.

Then, the sum of the entries a, b, c, d, e, f is _____.

Engineering Maths Daily Quiz # 44

44. $[A]_{m\times n}x = [b]_{n\times 1}$ be a system of equations then which of the following is true? (Mark all the appropriate choices)

A. If $m = n$ then the given system of equations has always a unique solution

B. If $m < n$ then the given system of equation has no solution

C. If $m < n$ then the given system of equation has infinite or no solution

D. If $m \leq n$ then the given system of equation has no solution

Engineering Maths Daily Quiz # 45

45. Consider a linear system of equations $A\vec{x} = \vec{b}$ where A is a 3×3 matrix and $\vec{b} \neq 0$. Suppose the rank of the matrix of coefficients $A = \left(a_{ij}\right)$ is equal to 2 then _____. (Mark all the appropriate choices)

A. there definitely exists a solution to the system of equations

B. there exists a non-zero column vector $\vec{v}$ in $\mathbb{R}^3$ such that $A\vec{v} = \overrightarrow{0}$

C. if there exists a solution to the system of equations $A\vec{x} = \vec{b}$ then at least one equation is a linear combination of the other two equations

D. $\det(A) = 0$

Engineering Maths Daily Quiz # 46

46. The system of linear equations

$$x + \lambda y - z = 0; \lambda x - y - z = 0; x + y - \lambda z = 0$$

has a non-trivial solution for

A. infinitely many values of λ

B. exactly one value of λ

C. exactly two values of λ

D. exactly three values of λ

Engineering Maths Daily Quiz # 47

47. Let $\alpha_1, \alpha_2, \beta_1, \beta_2$ be the roots of $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$, respectively. If the system of equations $\alpha_1 y + \alpha_2 z = 0$ and $\beta_1 y + \beta_2 z = 0$ has a non-trivial solution, then the value of $\dfrac{b^2}{q^2} = ?$

A. $\frac{ar}{pc}$

B. $\frac{ap}{rc}$

C. $\frac{ac}{pr}$

D. $\frac{pr}{ac}$

Engineering Maths Daily Quiz # 48

48. Let A be a 5×5 real matrix. Suppose 0 is one of the eigenvalues of A. Which of the following statements is true? (Mark all the appropriate choices)

A. System $AX = 0$ has a unique solution

B. System $AX = C$ has unique solution for any C

C. $AX = 0$ has a non-trivial solution

D. None of the above

Engineering Maths Daily Quiz # 49

49. The lower triangular matrix $[L]$ in the $[L][U]$ decomposition of the matrix given below

$$\begin{bmatrix} 25 & 5 & 4 \\ 10 & 8 & 16 \\ 8 & 12 & 22 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ \ell_{21} & 1 & 0 \\ \ell_{31} & \ell_{32} & 1 \end{bmatrix} \begin{bmatrix} u_{11} & u_{12} & u_{13} \\ 0 & u_{22} & u_{23} \\ 0 & 0 & u_{33} \end{bmatrix}$$

is _____.

A. $\begin{bmatrix} 1 & 0 & 0 \\ 0.40000 & 1 & 0 \\ 0.32000 & 1.7333 & 1 \end{bmatrix}$ B. $\begin{bmatrix} 25 & 5 & 4 \\ 0 & 6 & 14.400 \\ 0 & 0 & -4.2400 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 & 0 \\ 10 & 1 & 0 \\ 8 & 12 & 0 \end{bmatrix}$ D. $\begin{bmatrix} 1 & 0 & 0 \\ 0.40000 & 1 & 0 \\ 0.32000 & 1.5000 & 1 \end{bmatrix}$

Engineering Maths Daily Quiz # 50

50. The upper triangular matrix $[U]$ in the $[L][U]$ decomposition of the matrix given below

$$\begin{bmatrix} 25 & 5 & 4 \\ 0 & 8 & 16 \\ 0 & 12 & 22 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ \ell_{21} & 1 & 0 \\ \ell_{31} & \ell_{32} & 1 \end{bmatrix} \begin{bmatrix} u_{11} & u_{12} & u_{13} \\ 0 & u_{22} & u_{23} \\ 0 & 0 & u_{33} \end{bmatrix}$$

is _____.

A. $\begin{bmatrix} 1 & 0 & 0 \\ 0.40000 & 1 & 0 \\ 0.32000 & 1.7333 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 25 & 5 & 4 \\ 0 & 6 & 14.400 \\ 0 & 0 & -4.2400 \end{bmatrix}$

C. $\begin{bmatrix} 25 & 5 & 4 \\ 0 & 8 & 16 \\ 0 & 0 & -2 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 0.2000 & 0.16000 \\ 0 & 1 & 2.4000 \\ 0 & 0 & -4.240 \end{bmatrix}$

Engineering Maths Daily Quiz # 51

2. Calculus

51. If $\lim_{x \to 1} \frac{x^4 - 1}{x - 1} = \lim_{x \to k} \frac{x^3 - k^3}{x^2 - k^2}$, then k is _____.

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

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

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

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

Engineering Maths Daily Quiz # 52

52. $\lim_{y \to 0} \dfrac{\sqrt{1+\sqrt{1+y^4}} - \sqrt{2}}{y^4}$

A. exists and equals $\frac{1}{4\sqrt{2}}$

B. does not exist

C. exists and equals $\frac{1}{2\sqrt{2}}$

D. exists and equals $\frac{1}{2\sqrt{2}(\sqrt{2}+1)}$

Engineering Maths Daily Quiz # 53

53. $\lim_{h \to 0} \dfrac{f\left(2h+2+h^2\right)-f(2)}{f\left(h-h^2+1\right)-f(1)}$, given that $f'(2)=6$ and $f'(1)=4$,

A. does not exist

B. is equal to $-3/2$

C. is equal to $3/2$

D. is equal to 3

Engineering Maths Daily Quiz # 54

54. Let $\alpha, \beta \in R$ be such that $\lim_{x \to 0} \frac{x^2 \sin(\beta x)}{\alpha x - \sin x} = 1$. Then, $6(\alpha + \beta)$ equals _____.
(Numerical Answer Type)

Engineering Maths Daily Quiz # 55

55. Let m and n be two positive integers greater than 1.

If $\lim_{\alpha \to 0} \left(\frac{e^{\cos(\alpha^n)} - e}{\alpha^m} \right) = -\left(\frac{e}{2} \right)$, then the value of $\frac{m}{n}$ is _____. (Numerical Answer Type)

Engineering Maths Daily Quiz # 56

56. If the function f defined on $\left(\frac{\pi}{6}, \frac{\pi}{3}\right)$ by $f(x) = \begin{cases} \frac{\sqrt{2}\cos x - 1}{\cot x - 1}, & x \neq \frac{\pi}{4} \\ k, & x = \frac{\pi}{4} \end{cases}$ is continuous, then k is equal to

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

B. 2

C. 1

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

Engineering Maths Daily Quiz # 57

57. Let $f : R \to R$ be a function defined as

$$f(x) = \begin{cases} 5, & \text{if} \quad x \le 1 \\ a + bx, & \text{if} \quad 1 < x < 3 \\ b + 5x, & \text{if} \quad 3 \le x < 5 \\ 30, & \text{if} \quad x \ge 5 \end{cases}$$

Then, f is

A. continuous if $a = -5$ and $b = 10$

B. continuous if $a = 5$ and $b = 5$

C. continuous if $a = 0$ and $b = 5$

D. not continuous for any values of a and b

Engineering Maths Daily Quiz # 58

58. Let $f(x) = \begin{cases} -1, & -2 \le x < 0 \\ x^2 - 1, & 0 \le x \le 2 \end{cases}$ and $g(x) = |f(x)| + f(|x|)$. Then, in the interval $(-2, 2)$, g is _____.

A. not differentiable at one point

B. not differentiable at two points

C. differentiable at all points

D. not continuous

Engineering Maths Daily Quiz # 59

59. For every twice differentiable function $f : R \to [-2, 2]$ with $(f(0))^2 + (f'(0))^2 = 85$, which of the following statement(s) is (are) TRUE? (Mark all the appropriate choices)

A. There exist $r, s \in R$, where $r < s$, such that f is one-one on the open interval (r, s)

B. There exists $x_0 \in (-4, 0)$ such that $|f'(x_0)| \leq 1$

C. $\lim_{x \to \infty} f(x) = 1$

D. There exists $\alpha \in (-4, 4)$ such that $f(\alpha) + f''(\alpha) = 0$ and $f'(\alpha) \neq 0$

Engineering Maths Daily Quiz # 60

60. If $f(x) = \begin{cases} -x - \frac{\pi}{2}, & x \le -\frac{\pi}{2} \\ -\cos x, & -\frac{\pi}{2} < x \le 0 \\ x - 1, & 0 < x \le 1 \\ \ln x, & x > 1 \end{cases}$ Then (Mark all the appropriate choices)

A. $f(x)$ is continuous at $x = -\frac{\pi}{2}$

B. $f(x)$ is not differentiable at $x = 0$

C. $f(x)$ is differentiable at $x = 1$

D. $f(x)$ is differentiable at $x = -\frac{3}{2}$

Engineering Maths Daily Quiz # 61

61. If $f(1) = 1, f'(1) = 3$, then the derivative of $f(f(f(x))) + (f(x))^2$ at $x = 1$ is ------.

A. 12

B. 9

C. 15

D. 33

Engineering Maths Daily Quiz # 62

62. Let m_1 be the slope of the function $y = 3^x$ at the point $x = 0$ and let m_2 be the slope of the function $y = \log_3 x$ at $x = 1$ Then (Mark all the appropriate choices)

A. $m_1 m_2 = 1$

B. $m_1 = m_2$

C. $m_1 = -m_2$

D. $m_1 = 1/m_2$

Engineering Maths Daily Quiz # 63

63. Let $f(x) = 1 + 2x^2 + 2^2x^4 + \ldots + 2^{10}x^{20}$. Then $f(x)$ has

A. more than one minimum

B. exactly one minimum

C. at least one maximum

D. none of the above

Engineering Maths Daily Quiz # 64

64. Let $f(x) = a - (x-3)^{8/9}$, then maxima of $f(x)$ is _____.

A. 3

B. $a - 3$

C. a

D. none of these

Engineering Maths Daily Quiz # 65

65. If $f : R \to R$ is a differentiable function such that $f'(x) > 2f(x)$ for all $x \in R$, and $f(0) = 1$ then (Mark all the appropriate choices)

A. $f(x) > e^{2x}$ in $(0, \infty)$

B. $f'(x) < e^{2x}$ in $(0, \infty)$

C. $f(x)$ is increasing in $(0, \infty)$

D. $f(x)$ is decreasing in (0∞)

Engineering Maths Daily Quiz # 66

66. The least value of $\alpha \in R$ for which $4\alpha x^2 + \frac{1}{x} \geq 1$, for all $x > 0$, is _____.

A. $\frac{1}{64}$

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

C. $\frac{1}{27}$

D. $\frac{1}{25}$

Engineering Maths Daily Quiz # 67

67. If $f(x)$ is a non-zero polynomial of degree four, having local extreme points at $x = -1, 0, 1$, then the set $S = \{x \in R : f(x) = f(0)\}$ contains exactly

A. four rational numbers

B. two irrational and two rational numbers

C. four irrational numbers

D. two irrational and one rational number

Engineering Maths Daily Quiz # 68

68. If $x = -1$ and $x = 2$ are extreme points of $f(x) = \alpha \log|x| + \beta x^2 + x$, then

A. $\alpha = -6, \beta = \frac{1}{2}$

B. $\alpha = -6, \beta = -\frac{1}{2}$

C. $\alpha = 2, \beta = -\frac{1}{2}$

D. $\alpha = 2, \beta = \frac{1}{2}$

Engineering Maths Daily Quiz # 69

69. $f(x)$ is a function that is continuous and differentiable in the domain $[7, 15]$. If $f(7) = 21$ and $f'(x) \leq 14$ for all $7 \leq x \leq 15$, what is the maximum possible value of $f(15)$? (Numerical Answer Type)

Engineering Maths Daily Quiz # 70

70. If Rolle's theorem holds for the function $f(x) = x^3 - ax^2 + bx - 4, x \in [1, 2]$ with $f'\left(\frac{4}{3}\right) = 0$, then ordered pair (a, b) is equal to :

A. $(-5, -8)$

B. $(5, -8)$

C. $(-5, 8)$

D. $(5, 8)$

Engineering Maths Daily Quiz # 71

71. If $f : R \to R$ is a twice differentiable function such that $f''(x) > 0$ for all $x \in R$, and $f\left(\frac{1}{2}\right) = \frac{1}{2}, f(1) = 1$, then

A. $f'(1) \leq 0$

B. $f'(1) > 1$

C. $0 < f'(1) \leq \frac{1}{2}$

D. $\frac{1}{2} < f'(1) \leq 1$

Engineering Maths Daily Quiz # 72

72. Let the function, $f : [-7, 0] \to R$ be continuous on $[-7, 0]$ and differentiable on $(-7, 0)$. If $f(-7) = -3$ and $f'(x) \leq 2$, for $x \in (-7, 0)$, then for all such functions $f, f(-1) + f(0)$ lies in the interval :

A. $[-5, -7]$

B. $(-\infty, 6]$

C. $(-\infty, 20]$

D. $[-5, 3]$

Engineering Maths Daily Quiz # 73

73. If $f(x)$ is twice differentiable and continuous function in $x \in [a, b]$ also $f'(x) > 0$ and $f''(x) < 0$ and $c \in (a, b)$ then $\frac{f(c)-f(a)}{f(b)-f(c)}$ is greater than

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

B. 1

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

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

Engineering Maths Daily Quiz # 74

74. The integral $\int \sec^{23} x \operatorname{cosec}^{4/3} x dx$ is equal to (here C is a constant of integration)

A. $3\tan^{-1/3} x + C$

B. $-3\tan^{-1/3} x + C$

C. $-3\cot^{-1/3} x + C$

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

Engineering Maths Daily Quiz # 75

75. The integral

$$\int \frac{\sin^2 x \cos^2 x}{\left(\sin^5 x + \cos^3 x \sin^2 x + \sin^3 x \cos^2 x\right.} dx$$

is equal to

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

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

C. $\frac{1}{1+\cot^3 x} + C$

D. $\frac{-1}{1+\cot^3 x} + C$

(where C is a constant of integration)

Engineering Maths Daily Quiz # 76

76. If $\int f(x)dx = \psi(x)$, then $\int x^5 f\left(x^3\right)dx$ is equal to

A. $\frac{1}{3}\left[x^3\psi\left(x^3\right) - \int x^2\psi\left(x^3\right)dx\right] + c$

B. $\frac{1}{3}x^3\psi\left(x^3\right) - 3\int x^3\psi\left(x^3\right)dx + c$

C. $\frac{1}{3}x^3\psi\left(x^3\right) - \int x^2\psi\left(x^3\right)dx + c$

D. $\frac{1}{3}\left[x^3\psi\left(x^3\right) - \int x^3\psi\left(x^3\right)dx\right] + c$

Engineering Maths Daily Quiz # 77

77. The exact value of $\int_{0.2}^{2.2} xe^x dx$ is most nearly

A. 7.8036

B. 11.807

C. 14.034

D. 19.611

Engineering Maths Daily Quiz # 78

78. $\int_{0.2}^{2} f(x)dx$ for $f(x) = \begin{cases} x, & 0 \le x \le 1.2 \\ x^2, & 1.2 < x \le 2.4 \end{cases}$

is most nearly

A. 1.9800

B. 2.6640

C. 2.7907

D. 4.7520

Engineering Maths Daily Quiz # 79

79. Let f and g be continuous functions on $[0, a]$ such that $f(x) = f(a-x)$ and $g(x) + g(a-x) = 4$, then $\int_0^a f(x)g(x)dx$ is equal to

A. $4\int_0^a f(x)dx$

B. $\int_0^a f(x)dx$

C. $2\int_0^a f(x)dx$

D. $-3\int_0^a f(x)dx$

Engineering Maths Daily Quiz # 80

80. The value of the integral $\int_0^{1/2} \frac{1+\sqrt{3}}{\left((x+1)^2(1-x)^6\right)^{1/4}} dx$ is _____.

(Numerical Answer Type)

Engineering Maths Daily Quiz # 81

3. Probability and Statistics

81. A person throws two fair dice. He wins ₹15 for throwing a doublet (same numbers on the two dice), wins ₹12 when the throw results in the sum of 9, and loses ₹6 for any other outcome on the throw. Then, the expected gain/loss (in ₹) of the person is _____.

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

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

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

D. 2 gain

Engineering Maths Daily Quiz # 82

82. Two numbers are selected randomly from the set $S = \{1, 2, 3, 4, 5, 6\}$ without replacement one by one. The probability that the minimum of the two numbers is less than 4, is _____.

A. 1/15

B. 14/15

C. 1/5

D. 4/5

Engineering Maths Daily Quiz # 83

83. If E and F are events with $P(E) \leq P(F)$ and $P(E \cap F) > 0$, then which one is/are not correct? (Mark all the appropriate choices)

A. occurrence of $E \Rightarrow$ occurrence of F

B. occurrence of $F \Rightarrow$ occurrence of E

C. non-occurrence of $E \Rightarrow$ non-occurrence of F

D. None of the above

Engineering Maths Daily Quiz # 84

84. Three boys and two girls stand in a queue. The probability that the number of boys ahead of every girl is at least one more than the number of girls ahead of her, is _____.

A. 1/2

B. 1/3

C. 2/3

D. 3/4

Engineering Maths Daily Quiz # 85

85. Let $S = \{1, 2, \ldots, 20\}$. A subset B of S is said to be "nice", if the sum of the elements of B is 203. Then, the probability that a randomly chosen subset of S is "nice", is _____.

A. $\frac{6}{2^{20}}$

B. $\frac{4}{2^{20}}$

C. $\frac{7}{2^{20}}$

D. $\frac{5}{2^{20}}$

Engineering Maths Daily Quiz # 86

86. Three randomly chosen non-negative integers x, y and z are found to satisfy the equation $x + y + z = 10$. Then the probability that z is even, is _____.

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

B. $\frac{36}{55}$

C. $\frac{6}{11}$

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

Engineering Maths Daily Quiz # 87

87. If 12 identical balls are to be placed in 3 different boxes, then the probability that one of the boxes contains exactly 3 balls, is _____.

A. $\frac{55}{3}\left(\frac{2}{3}\right)^{11}$

B. $55\left(\frac{2}{3}\right)^{10}$

C. $220\left(\frac{1}{3}\right)^{12}$

D. $22\left(\frac{1}{3}\right)^{11}$

Engineering Maths Daily Quiz # 88

88. A group consists of 3 Norwegians, 4 Swedes, and 5 Finns, and they sit at random around a table. What is the probability that all groups end up sitting together?

A. $\frac{3!\cdot 4!\cdot 5!\cdot 2!}{11!}$

B. $\frac{3!\cdot 4!\cdot 5!}{11!}$

C. $\frac{3!\cdot 4!\cdot 5!\cdot 2!}{10!}$

D. $\frac{3!\cdot 4!\cdot 5!\cdot 2!}{12!}$

Engineering Maths Daily Quiz # 89

89. A bag has 6 pieces of paper, each with one of the letters, E, E, P, P, P, and R, on it. Pull 6 pieces at random out of the bag without replacement. What is the probability that these pieces, in order, spell PEPPER? (Mark all the appropriate choices)

A. $\frac{3!2!}{6!}$

B. $\frac{1}{60}$

C. $\frac{3!4!}{6!}$

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

Engineering Maths Daily Quiz # 90

90. Pick an integer in $[1, 1000]$ at random. The probability that it is divisible neither by 12 nor by 15 is _____. (Upto three digits after decimal) (Numerical Answer Type)

Engineering Maths Daily Quiz # 91

91. Two integers are selected at random from the set $\{1, 2, \ldots, 11\}$. Given that the sum of selected numbers is even, the conditional probability that both the numbers are even is _____.

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

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

C. $\frac{7}{10}$

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

Engineering Maths Daily Quiz # 92

92. Four persons independently solve a certain problem correctly with probabilities $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{1}{8}$. Then, the probability that the problem is solved correctly by atleast one of them, is _____.

A. $\frac{235}{256}$

B. $\frac{21}{256}$

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

D. $\frac{253}{256}$

Engineering Maths Daily Quiz # 93

93. Let X and Y be two events such that $P(X) = \frac{1}{3}, P(X/Y) = \frac{1}{2}$ and $P(Y/X) = \frac{2}{5}$. Then (Mark all the appropriate choices)

A. $P(Y) = \frac{4}{15}$

B. $P(X'/Y) = \frac{1}{2}$

C. $P(X \cup Y) = \frac{7}{15}$

D. $P(X \cap Y) = \frac{2}{15}$

Engineering Maths Daily Quiz # 94

94. An examination consists of multiple-choice questions, each having five possible answers. Suppose you are a student taking the exam. and that you reckon you have probability 0.75 of knowing the answer to any question that may be asked and that, if you do not know, you intend to guess an answer with probability 1/5 of being correct. What is the probability you will give the correct answer to a question? (Numerical Answer Type)

Engineering Maths Daily Quiz # 95

95. In a certain town, 30% of the people are Conservatives; 50% Socialists; and 20% Liberals. In this town at the last election, 65% of Conservatives voted, as did 82% of the Socialists and 50% of the Liberals. A person from the town is selected at random, and states that she voted at the last election. What is the probability that she is a Socialist? (Upto four places after decimal) (Numerical Answer Type)

Engineering Maths Daily Quiz # 96

96. Suppose the test for HIV is 99% accurate in both directions and 0.3% of the population is HIV positive. If someone tests positive, what is the probability they actually are HIV positive? (Upto two places after decimal) (Numerical Answer Type)

Engineering Maths Daily Quiz # 97

97. Example 4.6. Suppose 30% of the women in a class received an A on the test and 25% of the men received an A. The class is 60% women. Given that a person chosen at random received an A, what is the probability this person is a women? (Upto three places after decimal) (Numerical Answer Type)

Engineering Maths Daily Quiz # 98

98. A company makes optical lenses under contract to the US military. The lenes are ground to precise specifications and are shipped in lots of 100. Military inspectors check 2 different lenses on each lot of 100. Let E_1 be the event that the first lens fails the inspection and let E_2 be the event that the second lens fails the inspection. If either lens fails, the entire lot of 100 lenses is returned.

    Suppose that, in a particular shipment, 3 lenses are bad. What is the probability that the shipment is rejected? (Upto four places after decimal) (Numerical Answer Type)

Engineering Maths Daily Quiz # 99

99. A factory production line is manufacturing bolts using three machines, A, B and C. Of the total output, machine A is responsible for 25%, machine B for 35%, and machine C for the rest. It is known from previous experience with the machines that 5% of the output from machine A is defective, 4% from machine B and 2% from machine C. A bolt is chosen at random from the production line and found to be defective. What is the probability that it came from Machine A? (Upto three places after decimal) (Numerical Answer Type)

Engineering Maths Daily Quiz # 100

100. Suppose we have 3 cards identical in form except that both sides of the first card are colored red, both sides of the second card are colored black, and one side of the third card is colored red and the other side is colored black.

The 3 cards are mixed up in a hat, and 1 card is randomly selected and put down on the ground. If the upper side of the chosen card is colored red, what is the probability that the other side is colored black? (Upto three places after decimal) (Numerical Answer Type)

Engineering Maths Daily Quiz # 101

101. Varsha lives alone and dislikes cooking, so she goes out for dinner every evening. She has two favourite restaurants, Dosa Paradise and Kababs Unlimited, to which she travels by local train. The train to Dosa Paradise runs every 10 minutes, at $0, 10, 20, 30, 40$ and 50 minutes past the hour. The train to Kababs Unlimited runs every 20 minutes, at $8, 28$ and 48 minutes past the hour. She reaches the station at a random time between $7:15$ pm and $8:15$ pm and chooses between the two restaurants based on the next available train/ What is the probability that she ends up eating in Kababs Unlimited?

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

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

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

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

Engineering Maths Daily Quiz # 102

102. A permutation of $1, 2, \ldots, n$ is chosen at random. Then the probability that the numbers 1 and 2 appear as neighbour equals

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

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

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

D. $\frac{1}{n-2}$

Engineering Maths Daily Quiz # 103

103. A coin is such that after every toss the probability of same side coming again increases by 50% from the initial value. If initially the probability of head and tail are the same, what is the expected number of tosses until we get a head? (Numerical Answer Type)

Engineering Maths Daily Quiz # 104

104. Suppose X_i for $i = 1, 2, 3$ are independent and identically distributed random variables whose probability mass functions are $Pr[X_i = 0] = Pr[X_i = 1] = \frac{1}{2}$ for $i = 1, 2, 3$. Define another random variable $Y = X_1 X_2 \oplus X_3$, where $\oplus$ denotes XOR. Then $Pr[Y = 0 \mid X_3 = 0] =$ _____. (Numerical Answer Type)

Engineering Maths Daily Quiz # 105

105. If the difference between the expectation of the square of a random variable $\left(E\left[X^2\right]\right)$ and the square of the expectation of the random variable $(E[X])^2$ is denoted by R, then

A. $R = 0$

B. $R < 0$

C. $R \geq 0$

D. $R > 0$

Engineering Maths Daily Quiz # 106

106. A fair coin is flipped 10 times. What is the probability that it lands on heads the same number of times that it lands on tails? (Upto three decimal places) (Numerical Answer Type)

Engineering Maths Daily Quiz # 107

107. I am picking cards out of a deck. What is the probability that I pull out 2 kings out of 8 cards if I pull with replacement?

A. $\binom{8}{2}\left(\frac{1}{11}\right)^2 \cdot \left(\frac{12}{13}\right)^6$

B. $\binom{8}{2}\left(\frac{1}{13}\right)^2 \cdot \left(\frac{11}{13}\right)^6$

C. $\binom{8}{2}\left(\frac{1}{13}\right)^2 \cdot \left(\frac{12}{13}\right)^6$

D. $\binom{8}{2}\left(\frac{1}{12}\right)^2 \cdot \left(\frac{12}{13}\right)^6$

Engineering Maths Daily Quiz # 108

108. Consider two independent and identically distributed random variables X and Y uniformly distributed in $[0,1]$. For $\alpha \in [0,1]$, the probability that $\alpha \max(X,Y) < XY$ is _____.

A. $1/(2\alpha)$

B. $\exp(1-\alpha)$

C. $(1-\alpha)^2$

D. $1-\alpha^2$

Engineering Maths Daily Quiz # 109

109. A stick of length 2024 m is broken into two pieces, at a randomly chosen break point. The expected length of the shorter piece (in meters) is _____. (Numerical Answer Type)

Engineering Maths Daily Quiz # 110

110. Suppose the number of robberies in a neighbourhood can be modelled using a Poisson distribution. The probability that no robberies occur in a week is 0.135 . Given that the mean number of robberies per week is an integer, What is the probability that there are fewer than four robberies in week? (Numerical Answer Type)

Engineering Maths Daily Quiz # 111

111. Alice runs a stall at a fete in which the player is guaranteed to win \$10. Players pay a certain amount each time they throw a dice and must keep throwing the dice until a four occurs. When a four is obtained, Alice gives the player \$10. On average, Alice expects to make a profit of \$2 per game. How much does she charge for each throw? (Numerical Answer Type)

Engineering Maths Daily Quiz # 112

112. The time taken by a food delivery firm to deliver an order is exponentially distributed. If the firm has r employees, the average delivery time is $\frac{100}{r}$. What is the least number of employees the firm should employ to ensure that more than 99% of the orders are delivered within 30 minutes?

Engineering Maths Daily Quiz # 113

113. The number of chocolate chips in a cookie is Poisson distributed with an average of 15 chocolate chips. What is the probability that you pick up a cookie with only 10 chocolate chips in it?

A. $\frac{15^{10}e^{-10}}{10!}$

B. $\frac{15^{10}e^{-10}}{15!}$

C. $\frac{10^{15}e^{-15}}{10!}$

D. $\frac{15^{10}e^{-15}}{10!}$

Engineering Maths Daily Quiz # 114

114. The number of errors on a page is Poisson distributed with approximately 1 error per 50 pages of a book. What is the probability that a novel of 300 pages contains at most 1 error?

A. $7e^{-6}$

B. $6e^{-7}$

C. $2e^{-3}$

D. $3e^{-2}$

Engineering Maths Daily Quiz # 115

115. We roll two fair 6 sided die. What is the expected value of their product? (Numerical Answer Type)

Engineering Maths Daily Quiz # 116

116. While pulling out of a box of cookies, what is the expected number of cookies I have to pull out before I pull out an oatmeal raisin if 25% of cookies are oatmeal raisin and I choose with replacement? (Numerical Answer Type)

Engineering Maths Daily Quiz # 117

117. Cartons of milk at a supermarket are advertised as containing 1 litre, but in fact the volume is normally distributed with a mean of 1012ml and a standard deviation of 5 ml.

What is the probability that a randomly chosen carton contains more than 1010ml? (Upto four decimal places) (Numerical Answer Type)

Engineering Maths Daily Quiz # 118

118. The manufacturers of a new model of car claim that it gives an average mileage of 32.4 miles per gallon with standard deviation 1.4 miles per gallon. Assuming a normal distribution, what is the probability that a randomly chosen car of that model will give a mileage of less than 30 miles per gallon? (Upto four decimal places) (Numerical Answer Type)

Engineering Maths Daily Quiz # 119

119. Cartons of milk at a supermarket are advertised as containing 1 litre, but in fact the volume is normally distributed with a mean of 1012 ml and a standard deviation of 5 ml.

What is the probability that a randomly chosen carton contains less than the advertised quantity of milk? (Upto four decimal places) (Numerical Answer Type)

Engineering Maths Daily Quiz # 120

120. Suppose X is normal with mean 6. If $\mathbb{P}(X > 16) = 0.0228$, then what is the standard deviation of X? ($\Phi(2) = 0.9772$) (Numerical Answer Type)

Engineering Maths Daily Quiz # 121

121. Website Visits: On average, visitors leave your website after 5 minutes. Assume that the length of stay is exponentially distributed. What is the probability that a user stays more than 10 minutes? (Upto four decimal places) (Numerical Answer Type)

Engineering Maths Daily Quiz # 122

122. Approximating Normal: Your website has 100 users and each day each user independently has a 20% chance of logging into your website. Use a normal approximation to estimate the probability that more than 21 users log in. ($\phi(0.375) = 0.6462$) (Upto four decimal places) (Numerical Answer Type)

Engineering Maths Daily Quiz # 123

123. There are **7184** undergrads at Stanford. Each student has a 13% probability of taking CS106A at some point in their four years here. Let X be the number of students who take CS106A at Stanford. What is the approximate probability that more than 900 of these students will take CS106A? (Upto three decimal places) (Numerical Answer Type)

Engineering Maths Daily Quiz # 124

124. We have an array of Boolean variables, where n of them are 0 and m of them are 1. We remove them from the bag in a randomly chosen order. What is the expected number of instances in which a 0 is immediately followed by a 1?

A. $\frac{nm}{n-m}$

B. $\frac{nm}{n+m}$

C. $\frac{n+m}{nm}$

D. $\frac{n-m}{n+m}$

Engineering Maths Daily Quiz # 125

125. Let X be a random variable following normal distribution with mean $+1$ and variance 4. Let Y be another normal variable with mean -1 and variance unknown. If $P(X \leq -1) = P(Y \geq 2)$, the standard deviation of Y is _____.

A. 3

B. 2

C. $\sqrt{2}$

D. 1

Engineering Maths Daily Quiz # 126

126. If the variance of the first n natural numbers is 10 and the variance of the first m even natural numbers is 16 , then $m+n$ is equal to _____. (Numerical Answer Type)

Engineering Maths Daily Quiz # 127

127. 5 students of a class have an average height 150 cm and variance 18 cm^2. A new student, whose height is 156 cm, joined them. The variance (in cm^2) of the height of these six students is _____.

A. 16

B. 22

C. 20

D. 18

Engineering Maths Daily Quiz # 128

128. If the standard deviation of the numbers $-1, 0, 1, k$ is $\sqrt{5}$ where $k > 0$, then k is equal to ____.

A. $4\sqrt{\frac{5}{3}}$

B. $\sqrt{6}$

C. $2\sqrt{6}$

D. $2\sqrt{\frac{10}{3}}$

Engineering Maths Daily Quiz # 129

129. A bag contains 30 white balls and 10 red balls. 16 balls are drawn one by one randomly from the bag with replacement. If X be the number of white balls drawn, then $\left(\frac{\text{mean(x)}}{\text{standard deviation (x)}}\right)$ is _____.

A. 4

B. $4\sqrt{3}$

C. $3\sqrt{2}$

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

Engineering Maths Daily Quiz # 130

130. The mean and the variance of five observations are 4 and 5.20 , respectively. If three of the observations are 3,4 and 4; then the absolute value of the difference of the other two observations, is _____.

A. 7

B. 5

C. 1

D. 3