MATHS

BOOKS - BITSAT GUIDE

MATRICES

Practice Exercise

1. If A = $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ then which of the following is correct ?

A. (A+B) . (A-B) = $A^2 + B^2$

B. $(A + B).(A - B) = A^2 - B^2$

C. (A+B) . (A-B) =I

D. None of these

Answer: D

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2. If A = $\begin{bmatrix} 0 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 0 \end{bmatrix}$ and I is the identity matrix of order 2,??= (I-A) $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ is equal to

A. A

B. I

C. I+A

D. None of these

Answer: C

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3. If $A = \begin{bmatrix} 2 & 1 \\ -4 & -2 \end{bmatrix}$, then $I + 2A + 3A^2 + 4A^3 + \ldots\ldots\ldots\infty$ equals

A. $\begin{bmatrix} 4 & 1 \\ -4 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 3 & 1 \\ -4 & -1 \end{bmatrix}$

C. $\begin{bmatrix} 5 & 2 \\ -8 & -3 \end{bmatrix}$

D. $\begin{bmatrix} 5 & 2 \\ -3 & -8 \end{bmatrix}$

Answer: C

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4. If A = $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ then the value of $A^3 - 6A^2 + 7A + 2I$ is

A. I

B. O

C. $-2I$

D. 2I

Answer: C

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5. If A = $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ then A^n is equal to

A. $2^{n-1}A-(n-1)I$

B. $nA-(n-1)I$

C. $2^{n-1}A+(n-1)I$

D. $nA+(n-1)I$

Answer: B

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6. If A = $\begin{bmatrix}4 & 6 & -1\\ 3 & 0 & 2\\ 1 & -2 & 5\end{bmatrix}$, $B=\begin{bmatrix}2 & 4\\ 0 & 1\\ -1 & 2\end{bmatrix}$ and C $\begin{bmatrix}3\\ 1\\ 2\end{bmatrix}$

thenthe expression which is not defined is

A. $A^2+2B-2A$

B. CC

C. B'C

D. AB

Answer: A

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7. If p,q,r are 3 real numbers satisfying the matrix equation

[p,q,r] $\begin{bmatrix} 3 & 4 & 1 \\ 3 & 2 & 3 \\ 2 & 0 & 2 \end{bmatrix}$ = [3 , 0 ,1] then 2 p + q-r is equal to

A. -3

B. -1

C. 4

D. 2

Answer: A

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8. If A = $\begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and det $\left(A^3\right)$ = 125 then α is equal to

A. ± 1

B. ± 2

C. ± 3

D. ± 5

Answer: C

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9. If f(x) = $\begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and g(y) = $\begin{bmatrix} \cos x & 0 & \sin x \\ 0 & 1 & 0 \\ -\sin x & 0 & \cos x \end{bmatrix}$ then $[f(x)g(y)]^{-1}$ is equal to

A. f(-x) g(-y)

B. $f\left(x^{-1}\right)g\left(y^{-1}\right)$

C. g(-y) f(-x)

D. $g\left(y^{-1}\right)f\left(x^{-1}\right)$

Answer: C

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10. The trace of the matrix A $\begin{bmatrix} 2 & 5 & 9 \\ 7 & -5 & 3 \\ 2 & 6 & 8 \end{bmatrix}$ is equal to

A. 6

B. 5

C. 3

D. None of these

Answer: B

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11. If A= $\begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$ then det {adj (A)} equals

A. $(14)^2$

B. $(13)^2$

C. $(14)^3$

D. $(13)^3$

Answer: A

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12. If A and B are square matrices such that $A^2 = A, B^2 = B$and A,B commute, then

A. $(AB)^2 = I$

B. $(AB)^2 = AB$

C. $(AB)^2 = O$

D. None of these

Answer: B

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13. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ and $A^{-1} = \frac{1}{10}\begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 1 \end{bmatrix}$

then α is equal to

A. -2

B. 5

C. 2

D. -1

Answer: B

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14. If 3A = $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ and $A^TA = AA^T$ = I then xy is equal to

A. -1

B. 1

C. 2

D. -2

Answer: C

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15. If A and B are 3×3 matrices such that $A^2 - B^2 = (A - B)(A + B)$ then

A. either A or B is zero matrix

B. either A or B is unit matrix

C. A=B

D. AB=BA

Answer: D

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16. If x = cy + bz, y = az + cx and z = bx + ay , where x, y and z are not all zero, then $a^2 + b^2 + c^2$ is equal to

A. 1+ 2abc

B. 1− 2abc

C. 1+ abc

D. abc-1

Answer: B

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17. If $A = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$ is an orthogonal matrix, then

A. a=1 , b=2

B. a=-2 , b=1

C. a=3 , b=- 1

D. a=- 2 , b =-1

Answer: D

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18. The matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ -1 & -2 & -3 \end{bmatrix}$ is

A. idempotent

B. nilpotent

C. involutory

D. orthogonal

Answer: B

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19. If A = $\begin{bmatrix} \cos a & -\sin a \\ \sin a & \cos a \end{bmatrix}$ and A+A' =I then the value of a is

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

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

C. π

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

Answer: B

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20. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then $A^{-1} =$

A. A

B. A^2

C. A^3

D. A^4

Answer: C

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21. Let A = $\begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ and 10 B = $\begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$. If B is the inverse of matrix A then α equals

A. -2

B. 1

C. 2

D. 5

Answer: D

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22. If A is skew-symmetric and B $=(I-A)^{-1}(I+A)$ then B is

A. singular

B. symmetric

C. skew-symmetric

D. orthogonal

Answer: D

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23. Let a,b,c be positive real numbers. The following of equation

$$\frac{x^2}{a_2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1, \frac{x^2}{a^2}-\frac{y^2}{b^2}+\frac{z^2}{c^2}=1, -\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}$$

= 1 has

A. no solution

B. unique solution

C. nfinitely many solutions

D. finitely many solutions

Answer: B

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24. The equations x + 2y + 3z = 1, x − y + 4z = 0 and 2x + y + 7z = 1has

A. only one solution

B. only two solutions

C. no solution

D. infinitely many solutions

Answer: D

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25. If the equations a(y + z) = x,b (z + x) = y and c (x + y) = z have non-trivial solution, then $\frac{1}{1+a}+\frac{1}{1+b}+\frac{1}{1+c}$ is equal to

A. 1

B. 2

C. -1

D. -2

Answer: B

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26. The value of λ such that the system x − 2y + z = − 4, 2x − y + 2z = 2 and x + y + λz = 4

has no solution, is

A. 0

B. 1

C. $\neq 1$

D. 3

Answer: C

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27. If the system of equations $x-ky-z=0, kx-y-z=0, x+y-z=0$ has a non -zero solution then the possible values of k are

A. 0,1

B. $1-1$

C. $-1, 2$

D. $2, -2$

Answer: B

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Bitsat Archives

1. If $\omega(\neq 1)$ is a cube root of unity of

$$A = \begin{bmatrix} 1+2\omega^{100} & \omega^2 & 1 \\ 1 & 1+2\omega^{100} & \omega \\ \omega & \omega^2 & 2+\omega^{100}+2\omega^{200} \end{bmatrix}$$ then

A. A is singular

B. $|A| \neq 0$

C. A is symmetric

D. None of these

Answer: D

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2. If A = $\begin{bmatrix} -5 & -8 & 0 \\ 3 & 5 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ then A is

A. idempotent

B. nilpotent

C. involutory

D. None

Answer: C

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3. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ and $l = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then the correct statement is

A. $A^2 + 5A - 7l = O$

B. $-A^2 + 5A + 7l = O$

C. $A^2 - 5A + 7l = O$

D. $A^2 + 5A + 7l = O$

Answer: C

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4. If $A = (a_{ij})_{2\times 2}$ where $a_{ij} = i + j$ then A is equal to

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

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

C. $\begin{bmatrix} 1 & 4 \\ 3 & 3 \end{bmatrix}$

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

Answer: D

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5. If $A = \begin{bmatrix} 1 & -2 \\ 4 & 5 \end{bmatrix}$ and f(t) $= t^2 - 3t + 7$ then f(A) + $\begin{bmatrix} 3 & 6 \\ -12 & -9 \end{bmatrix}$ is equal to

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

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

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

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

Answer: B

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6. If A = $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and I is the unit matrix of order 2 then A^2 equals

A. 4A-3I

B. 3A-4I

C. A-I

D. A+I

Answer: A

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7. Let A be orthogonal and non-singular matrix of order n, then the determinant of matrix $(A - l_n)$ is equal to

A. $|l_n - A|$

B. $|A||l_n - A|$

C. |A|

D. $(-1)^n|A||l_n - A|$

Answer: B

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8. The inverse of the matrix $\begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$ is

A. $\frac{1}{11}\begin{bmatrix} 1 & 2 \\ -3 & 5 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 2 \\ -3 & 5 \end{bmatrix}$

C. $\frac{1}{13}\begin{bmatrix} -2 & 5 \\ 1 & 3 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$

Answer: A

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