



MATHS

BOOKS - CENGAGE

DETERMINANTS

Example

1. Evaluate $\begin{vmatrix} -9 & 5 \\ -2 & 1 \end{vmatrix}$

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2. Find the value of $\begin{vmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{vmatrix}$

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1. Evaluate of the following determinates :

$$\begin{vmatrix} 2 & 3 \\ 3 & 5 \end{vmatrix}$$



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2. Evaluate of the following determinates :

$$\begin{vmatrix} -4 & 5 \\ -5 & 6 \end{vmatrix}$$



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3. Evaluate of the following determinates :

$$\begin{vmatrix} 3 & 1 \\ -2 & -3 \end{vmatrix}$$



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4. Evaluate of the following determinates :

$$\begin{vmatrix} a & b \\ a & b \end{vmatrix}$$



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5. Evaluate of the following determinates :

$$\begin{vmatrix} 1 & \cos A \\ \cos A & 1 \end{vmatrix}$$



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6. Evaluate of the following determinates :

$$\begin{vmatrix} -b & b - c \\ c - b & a - c \end{vmatrix}$$



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1. Solve the following using determinates :

$$19x - 4y = 13$$

$$23x - 13y = 19$$



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2. Solve the following using determinates :

$$2x + 5y - 20 = 0$$

$$3x + 4y - 25 = 0$$



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3. Solve the following using determinates :

$$5x + 2y = 45$$

$$\frac{2x}{7} + \frac{3y}{5} = 25$$



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4. Solve the following using determinates :

$$2x - 4y = -3$$

$$4x + 2y = 9$$



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5. Solve the following using determinates :

$$5x + 2y = -2$$

$$4x + 6y = -3$$



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Test Yourself Level 3

1. Write the minor of all the elements of the determinate

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & k \end{vmatrix}$$



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2. Evaluate $\begin{vmatrix} 1 & 1 & 1 \\ 12 & 7 & 11 \\ 10 & 6 & 9 \end{vmatrix}$

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3. Evaluate $\begin{vmatrix} 5 & 20 & 25 \\ 8 & 72 & 56 \\ 1 & 6 & 6 \end{vmatrix}$

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4. Evaluate $\begin{vmatrix} 15 & 9 & 13 \\ 1 & 0 & 0 \\ 8 & 6 & 3 \end{vmatrix}$

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Test Yourself Level 3 M C Q

1. Which of the following is independent from θ

A. $\begin{vmatrix} \sec \theta & \tan \theta \\ \tan \theta & \sec \theta \end{vmatrix}$

B. $\begin{vmatrix} \sec \theta & \cos \theta \\ \cos \theta & \sin \theta \end{vmatrix}$

C. $\begin{vmatrix} 1 & \sin \theta \\ \cos \theta & 1 \end{vmatrix}$

D. $\begin{vmatrix} \cos \theta & 1 \\ \sin \theta & 1 \end{vmatrix}$

Answer: A



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2. What is the value of the following determinant

$$\begin{vmatrix} 5 & 10 & 15 \\ 10 & 20 & 30 \\ 25 & 30 & 35 \end{vmatrix}$$

A. 0

B. -10

C. 10

D. 100

Answer: A



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3. The value of determinate $\begin{vmatrix} 5 & 20 & 25 \\ 8 & 72 & 56 \\ 1 & 6 & 6 \end{vmatrix}$ is

A. 10

B. 20

C. 30

D. 40

Answer: D



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4. Evaluate the following determinant

$$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$$

A. 1

B. $a + b + c$

C. $ab + bc + ca$

D. 0

Answer: D



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5. What is the value of the following determinant

$$\begin{vmatrix} 1 & a & a^2 - bc \\ 1 & b & b^2 - ca \\ 1 & c & c^2 - ab \end{vmatrix}$$

A. 0

B. $(a + b + c)^2$

C. $(ab + bc + ca)(a + b + c)$

D. $1 - abc$

Answer: A



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6. The value of determinant $\begin{vmatrix} b+c & c & b \\ c & c+a & a \\ b & a & a+b \end{vmatrix}$ is

A. abc

B. $2abc$

C. $3abc$

D. $4abc$

Answer: D



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1. The value of the determinant

$$\begin{vmatrix} 0 & b^3 - a^3 & c^3 - a^3 \\ a^3 - b^3 & 0 & c^3 - b^3 \\ a^3 - c^3 & b^3 - c^3 & 0 \end{vmatrix} \text{ is equal to}$$

A. $a^3 + b^3 + c^3$

B. $a^3 - b^3 - c^3$

C. 0

D. $-a^3 + b^3 + c^3$

Answer: C



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$$2. \begin{vmatrix} \sin^2 x & \cos^2 x & 1 \\ a^3 - b^3 & 0 & c^3 - b^3 \\ a^3 - c^3 & b^3 - c^3 & 0 \end{vmatrix} =$$

A. 0

B. $12 \cos^2 x - 10 \sin^2 x$

C. $12 \sin^2 x - 10 \cos^2 x - 2$

D. $10 \sin 2x$

Answer: A

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3. If $a, b, c > 1$, $\Delta = \begin{vmatrix} \log_a(abc) & \log_a b & \log_a c \\ \log_b(abc) & 1 & \log_b c \\ \log_c(abc) & \log_c b & 1 \end{vmatrix}$ is

A. 0

B. $\log_a b + \log_b c + \log_c a$

C. $\log_{abc}(a + b + c)$

D. None of these

Answer: A

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4. The roots of the equation $\begin{vmatrix} 1 & 4 & 20 \\ 1 & -2 & 5 \\ 1 & 2x & 5x^2 \end{vmatrix} = 0$ are

A. $-1, -2$

B. $-1, 2$

C. $1, -2$

D. $1, 2$

Answer: B



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5. If $\Delta = \begin{vmatrix} abc & b^2c & c^2b \\ abc & c^2a & ca^2 \\ abc & a^2b & b^2a \end{vmatrix} = 0$, ($a, b, c \in \mathbb{R}$ and are all different and non-

zero) then

A. $abc = 0$

B. $ab + bc + ca = 0$

C. $a + b + c = 0$

$$D. a^2 + b^2 + c^2 = 1$$

Answer: C



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6.

$$\text{If } f(x) = \begin{vmatrix} x-3 & 2x^2-18 & 3x^3-81 \\ x-5 & 2x^2-50 & 4x^3-500 \\ 1 & 2 & 3 \end{vmatrix} \text{ then } f(1) \cdot f(2) + f(3) \cdot f(5) +$$

A. $f(1)$

B. $f(3)$

C. $f(1)+f(3)$

D. $f(1)+f(5)$

Answer: B



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7. In triangle ABC,

$$\begin{vmatrix} 1 & 1 & 1 \\ \cot \frac{A}{2} & \cot \frac{B}{2} & \cot \frac{C}{2} \\ \tan \frac{B}{2} + \tan \frac{C}{2} & \tan \frac{C}{2} + \tan \frac{A}{2} & \tan \frac{A}{2} + \tan \frac{B}{2} \end{vmatrix} = 0 \text{ then triangle}$$

must be

- A. equilateral
- B. isosceles
- C. obtuse angled
- D. None of these

Answer: B



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8. If $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a - b)(b - c)(c - a)(a + b + c)$ where a, b, c are all

different, then the determinant

$$\begin{vmatrix} 1 & 1 & 1 \\ (x-a)^2 & (x-b)^2 & (x-c)^2 \\ (x-b)(x-c) & (x-c)(x-a) & (x-a)(x-b) \end{vmatrix} \text{ vanishes when}$$

A. $a + b + c = 0$

B. $x = \frac{1}{3}(a + b + c)$

C. $x = \frac{1}{2}(a + b + c)$

D. $x = a + b + c$

Answer: B

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9. If $a + b + c \neq 0$ and $\begin{vmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{vmatrix} = 0$ then total number of different values of x is equal to

A. 1

B. 2

C. 3

D. None of these

Answer: C



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10. Which of the following is not the root of the equation

$$\begin{vmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{vmatrix} = 0?$$

A. 2

B. 0

C. 1

D. -3

Answer: B



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1. A 150 - m - long steamer has changed its direction through 30 degrees while moving through a distance equal to twice its own length. What is the radius of the circle in which it has moved ?

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2. A brick weighs 4 kg. What is the weight of similar brick, four times smaller and made of the same material

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3. Can you divide the number 45 into four parts such that addition of 2 to the first part , subtraction of 2 from the second part, multiplication of 2 to the third part , and division by 2 of the fourth part result in same number

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4. A cylindrical container has a radius of 8 inches and a height of 3 inches. How many inches should be added to either the radius or the height to give the same increase in the volume ?



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5. A bottle and its cork together cost Rs 1.10 and the bottle costs Rs 1 more than its cork. What is the cost of the bottle ?



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