Two mark questions:

1. **Find the equation of the line passing through** (3,2) and (9,3)**using determinants .(Mar 2014)**

   Sol: Let A = (3, 2), B = (9,3). Let P(x, y) be any point on the line joining AB. Thus, the point A, B and P are collinear. Hence the area of triangle formed by the points is zero.

   $$\text{i.e Area of } \Delta ABP = 0 \quad \Rightarrow \frac{1}{2}\begin{vmatrix} 3 & 2 & 1 \\ 9 & 3 & 1 \\ x & y & 1 \end{vmatrix} = 0$$

   $$\Rightarrow \begin{vmatrix} 3 & 2 & 1 \\ 9 & 3 & 1 \\ x & y & 1 \end{vmatrix} = 0$$

   $\Rightarrow$ 3(3-y) - 2(9-x) + 1(9y-3x) = 0

   $\Rightarrow$ x - 6y + 9 = 0which is the required equation of line

2. **Find the equation of the line joining the points** (1,2) and (3,6)**using determinants .(Jun 2014)**

   Sol: Let A = (1, 2), B = (3, 6). Let P(x, y) be any point on the line joining AB. Thus, the point A, B and P are collinear. Hence the area of triangle formed by the points is zero.

   $$\text{i.e Area of } \Delta ABP = 0 \quad \Rightarrow \frac{1}{2}\begin{vmatrix} 1 & 2 & 1 \\ 3 & 6 & 1 \\ x & y & 1 \end{vmatrix} = 0$$

   $$\Rightarrow \begin{vmatrix} 1 & 2 & 1 \\ 3 & 6 & 1 \\ x & y & 1 \end{vmatrix} = 0$$

   $\Rightarrow$ 1(6-y) - 2(3-x) + 1(3y-6x) = 0

   $\Rightarrow$ 2x - y = 0which is the required equation of line

3. **If the area of the triangle with vertices** (-2,0)**,**(0,4) and (0,k)**is 4 square units. Find the value of k using determinants.**
   (Mar 2015,Jun 2015)

Sol: Area of triangle = ±4 $\Rightarrow \frac{1}{2}\begin{vmatrix} -2 & 0 & 1 \\ 0 & 4 & 1 \\ 0 & k & 1 \end{vmatrix} = \pm 4$

$$\Rightarrow \begin{vmatrix} -2 & 0 & 1 \\ 0 & 4 & 1 \\ 0 & k & 1 \end{vmatrix} = \pm 8$$

$$\Rightarrow -2(4-k) = \pm 8$$

$$\Rightarrow -8 + 2k = \pm 8$$

$$\Rightarrow -8 + 2k = 8 \quad \text{or} -8 + 2k = -8$$

$$\Rightarrow \quad k = 8 \quad \text{or} \quad k = 0$$

4. **Using determinants show that points A**(a,b+c)**,B**(b,c+a) and C(c,a+b)**are collinear.**

(Mar 2016)

Sol: Area of triangle = $\frac{1}{2}\begin{vmatrix} a & b+c & 1 \\ b & c+a & 1 \\ c & a+b & 1 \end{vmatrix}$

$$= \frac{1}{2}\{a[c+a-(a+b)]-(b+c)[b-c]+1[b(a+b)-c(c+a)]\}$$

$$= \frac{1}{2}[a(c+a-a-b)-b^2+c^2+ab+b^2-c^2-ca]$$

$$= \frac{1}{2}[ac-ab-b^2+c^2+ab+b^2-c^2-ca]$$

$$= 0$$

Hence the given points are collinear.

5. **Find the area of the triangle whose vertices are** (3,8)**,**(-4,2) and (5,1)**by using determinant method.**

(Jun 2016)

Sol: Area of triangle = $\frac{1}{2}\begin{vmatrix} 3 & 8 & 1 \\ -4 & 2 & 1 \\ 5 & 1 & 1 \end{vmatrix}$

$$= \frac{1}{2}[3(2-1)-8(-4-5)+1(-4-10)]$$

$$= \frac{1}{2}[3 + 72 - 14]$$

$$= \frac{61}{2}$$

6. **Find the value of k if area of the triangle is 4 square units and vertices are** (k,0)**,**(4,0)**and (0,** 2)**using determinants.**
(Mar 2017)

Sol: Area of triangle = ±4 $\Rightarrow \frac{1}{2}\begin{vmatrix} k & 0 & 1 \\ 4 & 0 & 1 \\ 0 & 2 & 1 \end{vmatrix} = \pm 4$

$$\Rightarrow \frac{1}{2}[k(0-2)-0(4-0)+1(8-0)] = \pm 4$$

$$\Rightarrow \frac{1}{2}[-2k+8] = \pm 4$$

$$\Rightarrow 8 - 2k = \pm 8$$

$$\Rightarrow 8 - 2k = 8 \quad \text{or} \quad 8 - 2k = -8$$

$$\Rightarrow \quad k = 0 \quad \text{or} \quad k = 8$$

7. **Find the area of the triangle whose vertices are** (1,0)**,**(6,0) and (4,3)**by using determinant method.**
(Jun 2017)

Sol: Area of triangle = $\frac{1}{2}\begin{vmatrix} 1 & 0 & 1 \\ 6 & 0 & 1 \\ 4 & 3 & 1 \end{vmatrix}$

$$= \frac{1}{2}[1(0-3) - 0(6-4) + 1(18 - 0)$$

$$= \frac{1}{2}[-3 + 18]$$

$$= \frac{15}{2}$$

8. Find the area of the triangle whose vertices are (-2,-3),(3, 2) and (-1, -8)by using determinant method.
(Mar -2018)(Try Urself)

9. If area of the triangle with the vertices (2, -6), (5, 4)and (k, 4) is 35 square units, find the value of k using determinants.
(Jun-2018)(Try Urself)

10. Examine the consistency of the system $x + 3y = 5$ and $2x + 3y = 8$
11. Find the equation of the line passing through (3,1) and (9,3)using determinants.
12. Verify $A(adjA) = |A|I$ if $A = \begin{bmatrix} 2 & 3 \\ -4 & -6 \end{bmatrix}$
13. If any two rows of determinants are interchanged then sign of determinant changes.
14. Prove that if each rows of determinant is multiplied by constant k then its value get multiplied by k.
15. Prove that if A is invertible if and only if A is non-singular .
16. write minor and cofactors of $\begin{vmatrix} 2 & -4 \\ 1 & 3 \end{vmatrix}$