Chapter Determinants Ex 6.3 Q9

If the given points are collinear, then the area of the triangle must be zero.

$$\text{so } \frac{1}{2}\begin{vmatrix} k & 2-2k & 1 \\ -k+1 & 2k & 1 \\ -4-k & 6-2k & 1 \end{vmatrix} = 0$$

expanding along R_1

$$k(2k-6+2k)-(2-2k)(-k+1+4+k)+1(1-k)\times(6-2k)-2k(-4-k)=0$$

$$k(4k-6)-(2-2k)(5)+1\left[6-2k-6k+2k^2+8k+2k^2\right]=0$$

$$4k^2-6k-10+10k+6+4k^2=0$$

$$8k^2+4k-4=0$$

$$8k^2+8k-4k-4=0 \qquad \text{(Middle term splitting)}$$

$$8k(k+1)-4(k+1)=0$$

$$(8k-4)(k+1)=0$$

If $8k-4=0$ or if $k+1=0$

$k=\frac{1}{2}$ $k=-1$

Hence $k=-1,\frac{1}{2}$

Chapter Determinants Ex 6.3 Q10

Since the points are collinear, hence the area of the triangle must be zero.

$$\text{so } \frac{1}{2}\begin{vmatrix} x & -2 & 1 \\ 5 & 2 & 1 \\ 8 & 8 & 1 \end{vmatrix} = 0$$

$$\text{or } x(-6)+2(-3)+1(24)=0$$

$$\text{or } -6x-6+24=0$$

$$-6x+18=0$$

$$x=3$$

Hence $x=3$

Chapter Determinants Ex 6.3 Q11

Since the points are collinear, hence the area of the triangle must be zero.

$$\frac{1}{2}\begin{vmatrix} 3 & -2 & 1 \\ x & 2 & 1 \\ 8 & 8 & 1 \end{vmatrix} = 0$$

$$3(-6)+2(x-8)+1(8x-16)=0$$

$$-18+2x-16+8x-16=0$$

$$10x=50$$

$$x=5$$

Hence $x=5$

Chapter Determinants Ex 6.3 Q12(i)

Let $A(x, y), B(1, 2)$ and $C(3, 6)$ are 3 points in a line.

Since these points are collinear, hence area of the triangle must be zero.

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

Expanding along R_1

$$x(-4) - y(-2) + 1(0) = 0$$
$$-4x + 2y = 0$$
$$\text{or } 2x - y = 0$$
$$\text{or } y = 2x$$

Hence the equation is $y = 2x$

Chapter Determinants Ex 6.3 Q12(ii)

Let $A(x, y), B(3, 1)$ and $C(9, 3)$ are 3 points in a line.

Since these points are collinear, hence the area of the triangle ABC must be zero.

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

Expanding along R_1

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

Hence the equation of the line is $x - 3y = 0$

********** END **********