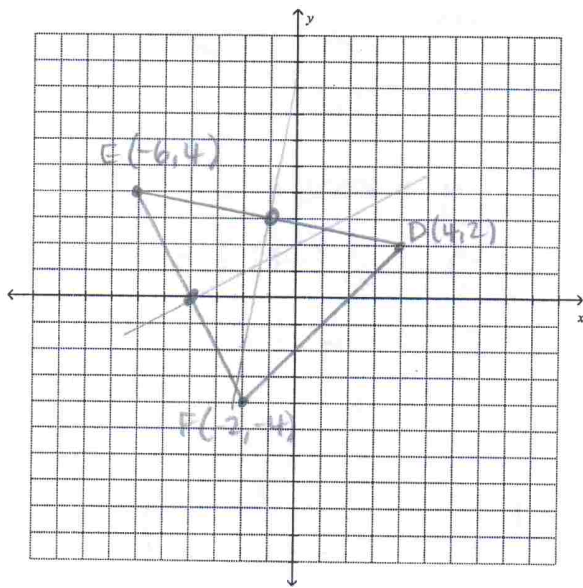


Quiz #8 – Analytic Geometry

Solution

Determine the circumcentre of  $\triangle DEF$  which has vertices  $D(4, 2)$ ,  $E(-6, 4)$  and  $F(-2, -4)$ .



① for perpendicular bisector of  $DE$ :

a) find midpoint  $DE$

$$M\left(\frac{4+(-6)}{2}, \frac{2+4}{2}\right)$$

$$= M\left(\frac{-2}{2}, \frac{6}{2}\right)$$

$$= M(-1, 3)$$

b) find slope of  $DE$

$$m = \frac{2-4}{4-(-6)}$$

$$= \frac{-2}{10}$$

$$= -\frac{1}{5}$$

$$m_{\perp} = 5$$

② for perpendicular bisector of  $EF$ :

a) find midpoint  $EF$

$$M\left(\frac{-6+(-2)}{2}, \frac{4+(-4)}{2}\right)$$

$$= M\left(\frac{-8}{2}, \frac{0}{2}\right)$$

$$= M(-4, 0)$$

b) find slope of  $EF$

$$m = \frac{-4-4}{-2-(-6)}$$

$$= \frac{-8}{4}$$

$$= -2$$

$$m_{\perp} = \frac{1}{2}$$

find eqn of  $\perp$  bisector  
of DE

$$m = 5$$

$$M(-1, 3)$$

$$y = mx + b$$

$$3 = 5(-1) + b$$

$$3 = -5 + b$$

$$8 = b$$

$$\boxed{y = 5x + 8}$$

find eqn of  $\perp$  bisector  
of EF

$$m = \frac{1}{2}$$

$$M(-4, 0)$$

$$y = mx + b$$

$$0 = \frac{1}{2}(-4) + b$$

$$0 = -2 + b$$

$$2 = b$$

$$\boxed{y = \frac{1}{2}x + 2}$$

Find point of intersection:

$$\textcircled{1} y = 5x + 8$$

$$\textcircled{2} y = \frac{1}{2}x + 2$$

by substitution:

$$5x + 8 = \frac{1}{2}x + 2$$

$$10x + 16 = x + 4$$

$$9x = -12$$

$$x = -\frac{12}{9}$$

$$x = -\frac{4}{3}$$

sub  $x = -\frac{4}{3}$  into  $\textcircled{1}$

$$y = 5\left(-\frac{4}{3}\right) + 8$$

$$y = -\frac{20}{3} + \frac{24}{3}$$

$$y = \frac{4}{3}$$

$\therefore$  the point of intersection is

$$\left(-\frac{4}{3}, \frac{4}{3}\right)$$

This point is the circumcentre.