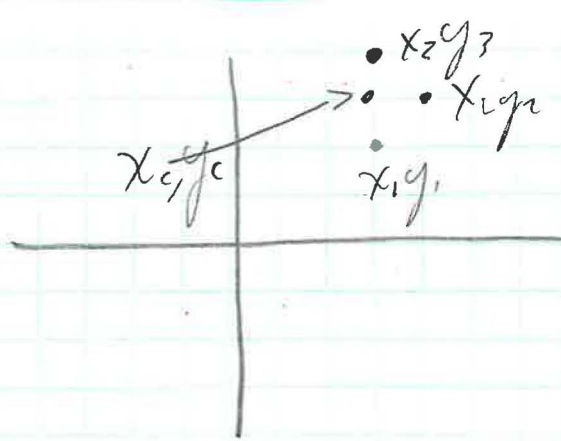


Create Circle Based on 3
points in a plane.

- Calculate Circle Center
- Calculate radius.



The distance from all 3 points to the center point s/b the same which is the radius of the circle

$$\overset{\text{Eq 1}}{(x_1 - x_c)^2 + (y_1 - y_c)^2} = \overset{\text{Eq 2}}{(x_2 - x_c)^2 + (y_2 - y_c)^2} = \overset{\text{Eq 3}}{(x_3 - x_c)^2 + (y_3 - y_c)^2}$$

From Eq 1 = Eq 2

$$x_1^2 - 2x_1x_c + \cancel{x_c^2} + y_1^2 - 2y_1y_c + \cancel{y_c^2} = x_2^2 - 2x_2x_c + \cancel{x_c^2} + y_2^2 - 2y_2y_c + \cancel{y_c^2}$$

$$x_1^2 - x_2^2 + y_1^2 - y_2^2 = 2x_1x_c + 2y_1y_c - 2x_2x_c - 2y_2y_c$$

↑
Constant

$$= 2x_c [x_1 - x_2] + 2y_c [y_1 - y_2]$$

↑
Constant

↑
Constant

Replace y_c

$$y_c = \frac{x_1^2 - x_2^2 + y_1^2 - y_2^2 - 2x_c [x_1 - x_2]}{2[y_1 - y_2]}$$

From Eq 1 = Eq 3

$$x_1^2 - x_3^2 + y_1^2 - y_3^2 = 2x_c [x_1 - x_3] + 2y_c [y_1 - y_3]$$

$$y_c = \frac{x_1^2 - x_3^2 + y_1^2 - y_3^2 - 2x_c [x_1 - x_3]}{2[y_1 - y_3]}$$

$$\frac{x_1^2 - x_2^2 + y_1^2 - y_2^2 - 2x_c[x_1 - x_2]}{2[y_1 - y_2]} = \frac{x_1^2 - x_3^2 + y_1^2 - y_3^2 - 2x_c[x_1 - x_3]}{2[y_1 - y_3]}$$

$$[x_1^2 - x_2^2 + y_1^2 - y_2^2][y_1 - y_3] - 2x_c[x_1 - x_2][y_1 - y_3] = [x_1^2 - x_3^2 + y_1^2 - y_3^2][y_1 - y_2] - 2x_c[x_1 - x_3][y_1 - y_2]$$

$$2x_c[(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)(y_1 - y_3)] = [x_1^2 - x_3^2 + y_1^2 - y_3^2][y_1 - y_2] - [x_1^2 - x_2^2 + y_1^2 - y_2^2][y_1 - y_3]$$

$$x_c = \frac{[x_1^2 - x_3^2 + y_1^2 - y_3^2][y_1 - y_2] - [x_1^2 - x_2^2 + y_1^2 - y_2^2][y_1 - y_3]}{2[(x_1 - x_3)(y_1 - y_2) - (x_1 - x_2)(y_1 - y_3)]}$$

6/.