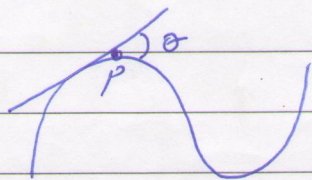


chapter one

1) Equation of Line

(a)



$P(x, y)$ إحداثيات نقطة

$ax + by + c = 0$ معادلة مستقيم

$$m = \tan \theta = \frac{-x_{\text{مقطع}}}{x_{\text{مقطع}}} \text{ ميل}$$

$[y - y_1 = m(x - x_1)]$ معادلة المستقيم المطلوب

(b) إذا أعطانا الرأى نقطتين تنتمي لمستقيم

عندها يكون ميل (m) يساوي

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Ex. Find the equation of the Line
passes-through the points

$P(2, 3)$, $P(4, 9)$

Sol.

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 3}{4 - 2} = 3$$

نقطة مختارة، لنقطة

$$P(2, 3)$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = 3(x - 2)$$

$$y - 3 = 3x - 6$$

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

$$y = 3x - 3$$

(ب) يعطى، اوال نقطة معلومة ومعادلة مستقيم يقارني

المستقيم المطلوب

اذا كان، المستقيمان متوازيان فان $(m = m_1)$

يجب لها نفس الميل

ex. Find the equation of line passes

through $(3, 4)$ and parallel the line

$$2y = 4x + 3$$

Sol.

$$2y = 4x + 3$$

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

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

$$y - y_1 = m(x - x_1)$$

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

$$y - 4 = 2x - 6$$

$$y = 2x - 6 + 4$$

$$y = 2x - 2$$

Δ يعطى نقطة معلومة، ومعادلة مستقيم عمودي على

المستقيم المطلوب

$$ax + by = c$$

$$m_1 = \frac{-a}{b}$$

$$m = \frac{-1}{m_1}$$

EX. Find the equation of the line passes through $(-1, 2)$ and perpendicular of

the Line $x = +2y + 6$

sol.

$$x - 2y = 6$$

$$m_1 = \frac{-1}{+2} = +\frac{1}{2}$$

$$m = \frac{-1}{m_1} = \frac{-1}{+\frac{1}{2}} = -2$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = -2(x - (-1))$$

$$y - 2 = -2x - 2$$

$$y = -2x$$

(5) يعطى نقطة ومستمى، يطلب الخط

$$m = y' \quad \text{لذا فإن}$$

ex. Find retangent to the curve at (1,1)

$$y = x^2 + y^2 + 2xy$$

sol.

$$y' = 2x - 2yy' + 2xy' + 2y$$

$$(2yy' - 2xy' + y') = 2x + 2y$$

$$y' = \frac{2x + 2y}{2y - 2x + 1}$$

$$m = y' = \frac{2(1) + 2(1)}{2(1) - 2(1) + 1} = \frac{4}{1} = 4$$

$$(y - y_1) = m(x - x_1)$$

$$y - 1 = 4(x - 1)$$

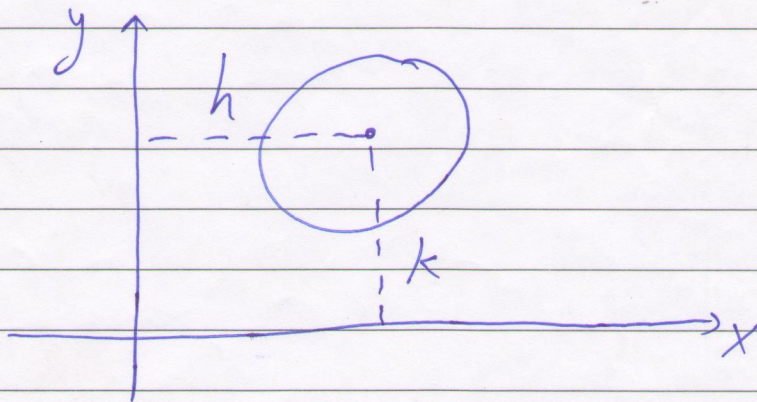
2) Equation Circle

$$[(x-h)^2 + (y-k)^2 = r^2] \quad \text{معادلة دائرة}$$

(h, k) إحداثيات مركز الدائرة

h بعد مركز الدائرة عن محور y

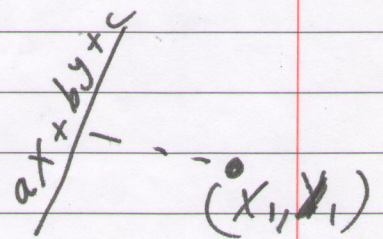
k بعد مركز الدائرة عن محور x



$$[P_1 P_2 = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}] \quad \text{البعد بين نقطتين}$$

البعد بين نقطة وإستقيم

$$[p = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}]$$



معادلة دائرة ونقطة

$$x^2 + y^2 + ax + by + c = 0$$

$$h = - \frac{x \text{ معلوم}}{2}$$

$$k = - \frac{y \text{ معلوم}}{2}$$

$$R = \sqrt{h^2 + k^2 - c}$$

ملاحظة اذا كان مركز الدائرة نقطة $(0,0)$

$$x^2 + y^2 = R^2 \quad \text{فان معادلة الدائرة تكون}$$

Ex. Find the distance between the line

$$2y + x = 3 \quad \text{and the Point } (-1, 4)$$

Sol. $2y + x - 3 = 0$

$$a = 1, \quad b = 2, \quad c = -3$$

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

$$= \frac{|1 \times (-1) + 2 \times 4 - 3|}{\sqrt{1^2 + 2^2}} = \frac{4}{\sqrt{5}}$$

EX. Find eq. circle tangent $y=2$
and center $(1, -1)$

Sol.

$$y=2$$

$$y-2=0$$

$$a=0, b=1, c=-2$$

$$d=R = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$
$$= \frac{|0 \times 1 + 1 \times (-1) + (-2)|}{\sqrt{0^2 + 1^2}}$$

$$R = \frac{|-3|}{1} = 3$$

EX. Find the equation of the circle
if the center $(3, 4)$ and radius

is 5

Sol

$$(x-h)^2 + (y-k)^2 = R^2$$

$$(x-3)^2 + (y-4)^2 = 5^2$$

Ex. Find the center and radius of circle $2y^2 + 2x^2 + 4x - 8y = 6$?

sol

$$2y^2 + 2x^2 + 4x - 8y - 6 = 0 \quad \div 2$$

$$y^2 + x^2 + 2x - 4y - 3 = 0$$

$$h = -\frac{2}{2} = -1, \quad k = -\frac{-4}{2} = +2$$

$$R = \sqrt{h^2 + k^2 - c}$$

$$R = \sqrt{(-1)^2 + (2)^2 - (-3)} = \sqrt{8}$$

$$(x-h)^2 + (y-k)^2 = R^2$$

$$(x+1)^2 + (y-2)^2 = (\sqrt{8})^2$$

EX. Find equation of circle if the circle tangent the two lines $y = 6$, $x = 7$ and radius is 1

Sol.

1) circle 1

$$h = 7 - 1 = 6$$

$$k = 6 + 1 = 7$$

$$(x - 6)^2 + (y - 7)^2 = 1$$

2) circle 2

$$h = 7 + 1 = 8 , k = 6 + 1 = 7$$

$$(x - 8)^2 + (y - 7)^2 = 1$$

3) circle 3

$$h = 7 - 1 = 6 , k = 6 - 1 = 5$$

$$(x - 6)^2 + (y - 5)^2 = 1$$

