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Course: Medicine and surgery

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MAT 104

(1)

y-3x – 2 = 0 and 3y + x + 9 =0

let p = y – 3x – 2 = 0

=dy/dx – 3 -3 =0

= dy/dx – 3= 0

=dy/dx = 3

Let q = 3y +x + 9 = 0

3 dy/dx + 1 + 0 = 0

3 dy/dx = -1/3

P + q

:. Y -3x – 2 = 0 is perpendicular to 3y + x + 9 = 0

(2)

3y – 4 = 2x + 3 and y – 5 = x + 6

Let p be 3y – 4 = 2x + 3

3 dy/dx – 0 = 2 + 0

3 dy/dx = 2

Dy/dx = 2/3

Let q be y – 5 = x + 6

Dy/dx – 0 = 1 + 0

Dy/dx = 1

Perpendicular lines = (m1m2) = -1

2/3 X 1 = 2/3

:. P ≠Q

i.e. 3y – 4 = 2x + 3 and y – 5 = x + 6 is not perpendicular

(3)

X² + y² + 3xy – 11 = 0 (x=1 , y=2)

x² + y ( y + 3x ) – 11 = 0

y (y + 3x) = 11 - x²

y = 11 - x²/y + 3x

at x = 1 and y = 2

using product rule

dy/dx = V du/dx – U dv/dx

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V²

(y + 3x ) ( -2x ) – (11 - x²) (4)

(y + 3x²)

= - 2xy – 6x² - (44 – 4x²)

y² + 6xy + 9x²

= -2xy – 6 x² - 44 + 4x²

y² + 6xy + 9x²

= - 2xy – 2x² - 44

y² + 6xy + 4x²

at x =1 , y = 2

Dy/dx|x=1, y=2 = - [ 2(1) (2)] + 2(1) ² + 44 =- 2

2² + 6(1)(2) + 4(1)

:. M =- 2

X =1 , y=2

Equation of the tangent to a curve

Y – y1 = m (x – x1)

Y -2 = -2(x – 1)

Y – 2 = -2x + 2

y + 2x – 4 = 0

Equation of the normal to the curve

Y – y1 = m (x – x1)

Y – 2 = -1/ -2 (x – 1)

y – 2 = ½ ( x – 1)

y – 2 = 1x/2 – ½

y – 2 = x/2 – ½

y – 2 – x/2 + ½ = 0

y – x/2 – 3/2 = 0

multiplying through by 2

2y – x – 3 = 0