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19/ENCS05/012 Mechatronics Engineering

1  $x^2 + y^2 - 5x + y - 4 = 0$

$$x^2 - 5x + y^2 + y = 4$$

$$x^2 - 5x + \left(\frac{5}{2}\right)^2 + y^2 + y + \left(\frac{1}{2}\right)^2 = 4 + \left(\frac{5}{2}\right)^2 + \left(\frac{1}{2}\right)^2$$

$$x^2 - \left(x - \frac{5}{2}\right)^2 + \left(y + \frac{1}{2}\right)^2 = -10$$

$$\therefore C = \left(\frac{5}{2}, -\frac{1}{2}\right)$$

$$M_T = -\frac{1}{M_C} = -\frac{x_2 - x_1}{y_2 - y_1} = -\frac{\frac{5}{2} - 1}{-\frac{1}{2}} = 3$$

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

$$y = 3x - 3$$

2  $x^2 + 12x + y^2 - 12y = -47$

$$x^2 + 12x + y^2 - 12y = -47$$

$$(x+6)^2 + (y-6)^2 = -47 + 6^2 + 6^2$$

$$\therefore C = (-6, 6)$$

$$M_T = -\frac{1}{M_C} = -\frac{6 - 1}{6 - 0} = -\frac{5}{6}$$

$$y - 6 = -\frac{5}{6}(x + 6)$$

$$\therefore y = -\frac{5}{6}x + \frac{5}{6}$$

3  $x^2 - 8x + y^2 + 14y = -40$

$$x^2 - 8x + y^2 + 14y + 7^2 = -40 + 4^2 + 7^2$$

$$(x-4)^2 + (y+7)^2 = -40 + 4^2 + 7^2$$

$$\therefore C = (4, -7)$$

$$M_T = -\frac{1}{M_C} = -\frac{4 - 1}{-7 - 0} = \frac{3}{7}$$

$$y - 0 = \frac{3}{7}(x - 1)$$

$$y = \frac{3}{7}x - \frac{3}{7}$$