2/62 $x = 3t^2 - 4t, \quad \dot{x} = 6t - 4, \quad \ddot{x} = 6 \text{ mm/s}^2$

$y = 4t^2 - \frac{1}{3}t^3, \quad \dot{y} = 8t - t^2, \quad \ddot{y} = 8 - 2t \text{ mm/s}^2$

When $t = 2$ s, $\dot{x} = 12 - 4 = 8$ mm/s, $\dot{y} = 16 - 4 = 12$ mm/s

$v = \sqrt{\dot{x}^2 + \dot{y}^2} = \sqrt{8^2 + 12^2} = \underline{14.42 \frac{\text{mm}}{\text{s}}}$

$\theta_x = \tan^{-1}\frac{\dot{y}}{\dot{x}} = \tan^{-1}\frac{12}{8} = \underline{56.3^\circ}$

$\ddot{x} = 6 \text{ mm/s}^2, \quad \ddot{y} = 8 - 4 = 4 \text{ mm/s}^2$

$a = \sqrt{\ddot{x}^2 + \ddot{y}^2} = \sqrt{6^2 + 4^2} = \underline{7.21 \text{ mm/s}^2}$

$\theta_x = \tan^{-1}\frac{\ddot{y}}{\ddot{x}} = \tan^{-1}\frac{4}{6} = \underline{33.7^\circ}$