

Answers:

$$2 \quad \frac{2x^3 + 10x - 9}{(2-x)(1+2x^2)} = -1 + \frac{3}{2-x} + \frac{2x-5}{1+2x^2}$$

$$3 \quad (i) \quad 2 \text{ cm} \quad (ii) \quad \frac{1}{6} \text{ cm/s}$$

$$4 \quad \frac{dy}{dx} = \frac{x(5x-2)}{\sqrt{2x-1}}; \quad 14\sqrt{7}+1$$

$$5 \quad (i) \quad 0.594 \quad (ii) \quad \text{no solution}$$

$$6 \quad (a) \quad -2 < x < 2\frac{1}{3}$$

$$(b)(i) \quad m \geq 12p \text{ or } m - 12p \geq 0 \text{ or } 4m^2 - 48pm \geq 0$$

$$(ii) \quad \frac{m}{p} = 12$$

$$(iii) \quad x = -12$$

$$7 \quad (i) \quad \theta = 0.970 \quad (ii) \quad \theta = 1.94$$

$$(iii) \quad \text{Smallest value} = 0, \quad \theta = 1.37$$

$$\text{Largest value} = 104, \quad \theta = 2.94$$

$$8 \quad (a) \quad P(5, 12) \quad (ii) \quad \left(x - \frac{11}{2}\right)^2 + (y-3)^2 = \frac{325}{4} \quad (iii) \quad a = \frac{11 \pm 5\sqrt{13}}{2}$$

$$9 \quad (i) \quad \frac{dy}{dx} = e^{-x}(3\sin 2x + 4\cos 2x)$$

$$(ii) \quad x = 2.68 \quad (iii) \quad -0.137; \text{ minimum point}$$

$$10 \quad (b) \quad v_0 = 891 \text{ ml} \quad (c) \quad k = 0.0168 \quad (d) \quad 52.5 \text{ hours}$$

$$11 \quad (a) \quad \underline{\frac{3}{2}e - 3 \text{ units}^2} \quad (b) \quad y = -3x + 3$$