

1.) Velocity

$$v = (4t - 3t^2) \text{ m/s}$$

$$s = \int v \cdot dt$$

$$s = \int (4t - 3t^2) \cdot dt$$

$$s = 2t^2 - t^3 + C$$

$$s = 2(4)^2 - 4^3 + 0$$

$$s = 32 - 64 + 0$$

$$s = -32 \text{ m}$$

2.)  $v = (0.5t^3 - 8t) \text{ m/s}$

$$a = \frac{dv}{dt}$$

$$a = 1.5t^2 - 8$$

at  $t = 2$

$$a = 1.5(2)^2 - 8$$

$$a = -2 \text{ m/s}^2 \text{ (deceleration)}$$

$$\text{acceleration } a = (4t^2 - 2) \text{ m/s}^2$$

3.) acceleration  $a = (4t^2 - 2) \text{ m/s}^2$

$$a = 4t^2 - 2 \text{ m/s}^2$$

+20 s = 20m

$$a = \frac{dv}{dt}$$

+22 s = 20m

+24 s = ?

$$dv = a \cdot dt$$

$$dv = (4t^2 - 2t) \cdot dt$$

$$v = \frac{4t^3}{3} - 2t^2 + C$$

$$v = \frac{ds}{dt}$$

$$= (4t^{\frac{3}{3}} - 2t + C_1) \cdot dt$$

$$s = \frac{4t^4}{12} - \frac{2t^2}{2} + C_1 \cdot t + C_2$$

$$\text{At } t=0 \quad s = -2\text{m}$$

$$\text{At } 2 = \frac{4(0)^4}{12} - (0)^2 + C_1(0) \quad C_2 = -2$$

$$\text{At } t = 2\text{s} \quad s = 20\text{m}$$

$$-20 = \frac{4(2)^4}{12} - \frac{2 \times 2^2}{2} + 2 \times C_1 - 2$$

$$-18 = 5.33 - 4 + 2C_1$$

$$-18 - 5.33 + 4 = C_1$$

$$C_1 = -9.665$$

$$s = \frac{4t^4}{12} - 2 \times \frac{t^2}{2} + 2(-9.665)$$

$$s = \frac{4(4)^4}{12} - \frac{2 \times 4^2}{2} - 19.324$$

$$s = 85.33 - 16 - 19.324$$

$$s = 50.006\text{m}$$

4.)

$$v = 20 - 0.05s^2$$

$$a = v \cdot \left(\frac{dv}{ds}\right)$$

$$\frac{dv}{ds} = -0.1s$$

$$a = (20 - 0.05s^2) \cdot (-0.1)s$$

$$a = -2s - 0.005s^3$$

$$a = s = 15\text{m}$$

$$a = -2(15) + 0.005(15)^3$$

$$a = -30 + 16.875$$

$$a = -13.125\text{m}^2$$