

Name: Ezeoke Chidi Brigwe

Matric Number: 17/EN907/025

Course: Mechanics

Department: Petroleum Engineering

1. $v = 4t - 3t^2$

$$s = \int v dt$$

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

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

$$s = 0 \text{ when } t = 0$$

$$0 = 2(0)^2 - (0)^3 + C$$

$$C = 0$$

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

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

$$s = 32 - 64 + 0$$

$$s = -32$$

= 32m left on the X-axis

2. $a = 4t^2 - 2$

$$v = \int a dt$$

$$v = \frac{4t^3}{3} - \frac{2t}{1} + C$$

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

$$= \int v dt$$

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

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

$$20 = \frac{16}{3} - 4 + \frac{C^2}{2}$$

$$\frac{56}{3} = \frac{c^2}{2}$$

$$c^2 = \frac{112}{3} \quad c = 6.11$$

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

$$S = \frac{t^4}{3} - t^2 + \frac{56}{3} \quad t = 4.5$$

$$S = \frac{4^4}{3} - 4^2 + \frac{56}{3}$$

$$= \frac{256}{3} - 16 + \frac{56}{3} = \frac{256 - 48 + 56}{3}$$

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

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

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

where $t = 2\text{ s}$

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

$$a = 6 - 8 = -2 \text{ m/s}^2$$

4. $v = (20 - 0.05t^2) \text{ m/s}$

at $s = 15$

$$v = 20 - 0.05(15)^2$$

$$v = 20 - (0.05 \times 225)$$

$$v = 20 - 11.25$$

$$v = 8.75 \text{ m/s}$$

Using $v^2 = u^2 + 2as$

$$8.75^2 = 0^2 + (2a \times 15)$$

$$30a = 76.5625$$

$$a = \frac{76.5625}{30} = a = 2.55 \text{ m/s}^2$$