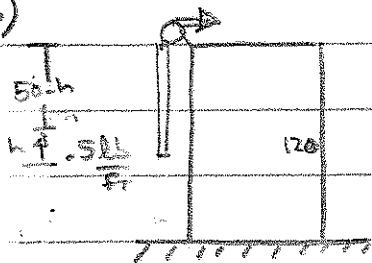


6)



$$W = Fd$$

$$F = \left(\frac{1}{2} \frac{lb}{ft}\right)(50-h), d = dh$$

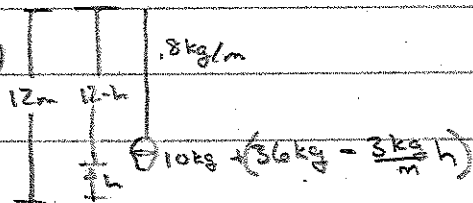
$$W = \int_0^{50} \frac{1}{2}(50-h) \frac{lb}{ft} dh = \frac{1}{2} \left(50h - \frac{h^2}{2}\right) \Big|_0^{50}$$

$$= \frac{1}{2} \left(50^2 - \frac{50^2}{2}\right) = \frac{1}{2} \left(\frac{50^2}{2}\right) = \frac{2500}{4} = 625$$

$$\boxed{\text{Work} = 625 \text{ ft}\cdot\text{lb}}$$

$$\Big|_0^{25} = \frac{1}{2} \left(50(25) - \frac{25^2}{2}\right) = 468.75$$

7)



$$W = Fd \quad F = ma \quad a = g = -9.8 \text{ m/s}^2$$

$$m = (0.8(12-h) + 10 + (36-3h))$$

$$d = dh \quad m = 9.6 - 0.8h + 46 - 3h$$

$$m = 55.6 - 3.8h$$

$$W = g \int_0^{12} (55.6 - 3.8h) dh$$

$$= g \left[55.6h - 3.8 \left(\frac{h^2}{2} \right) \right]_0^{12} = g \left[55.6(12) - \frac{3.8}{2}(12^2) \right]$$

$$= 9.8 \frac{\text{m}}{\text{s}^2} [393.6 \text{ kg}\cdot\text{m}]$$

$$\boxed{W = 3857.28 \frac{\text{kg}\cdot\text{m}}{\text{s}^2} = 3857.28 \text{ Nm} = 3857.28 \text{ J}}$$

8) $f(x) = 3x + 7$ over $[2, 4]$

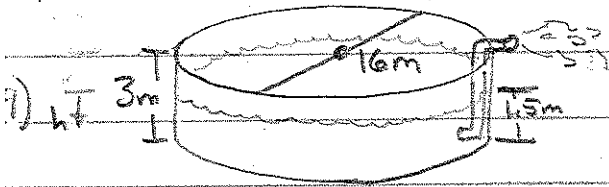
$$f_{\text{avg}} = \frac{1}{4-2} \int_2^4 (3x+7) dx = \frac{1}{2} \left[\frac{3x^2}{2} + 7x \right]_2^4$$

$$= \frac{1}{2} \left[\frac{3}{2}(16-4) + 7(4-2) \right]$$

$$= \frac{1}{2} [18 + 14]$$

$$= 16$$

$$\boxed{f_{\text{avg}} = 16}$$



$$W = FD$$

$$D = h + 1.5$$

$$F = ma$$

$$a = g = 9.8 \text{ m/s}^2$$

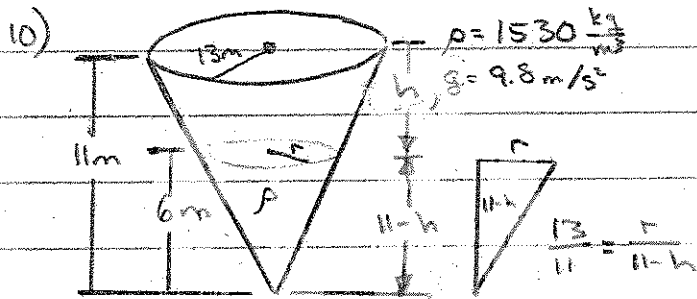
$$m = \rho \pi r^2 dh = (64\pi dh) \text{ m}^3 \rho \left(\frac{\text{kg}}{\text{m}^3} \right)$$

$$W = \int_0^{1.5} (64\pi dh) g(h+1.5)$$

$$= 64\pi g \int_0^{1.5} (h+1.5) dh = 64\pi g \left(\frac{h^2}{2} + 1.5h \right) \Big|_0^{1.5} = 64\pi g \left(\frac{1.5^2}{2} + 1.5^2 \right) =$$

$$= 64\pi g (3.375) = 216\pi g \text{ Nm} = W = 216\pi g \text{ J}$$

$$\rho = 1000 \text{ kg/m}^3, g = 9.8 \text{ m/s}^2$$



$$W = FD$$

$$D = h, \int_5^{11}$$

$$F = ma, a = g = 9.8$$

$$m = (\pi r^2 dh) \rho$$

$$\rho = 1530 \text{ kg/m}^3$$

$$r = \frac{13}{11}(11-h)$$

$$W = \int_5^{11} FD = \int_5^{11} \pi \rho dh \left(\frac{13}{11}(11-h) \right)^2 gh$$

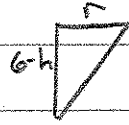
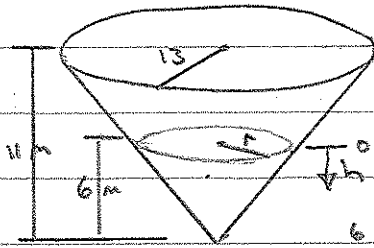
$$= \left(\frac{13}{11} \right)^2 \pi \rho g \int_5^{11} (121 - 22h + h^2) h dh = \left(\frac{13}{11} \right)^2 \pi \rho g \left[121 \frac{h^2}{2} - \frac{22h^3}{3} + \frac{h^4}{4} \right]_5^{11}$$

$$\left(\frac{13}{11} \right)^2 \pi \rho g \left[\frac{121}{2} (11^2 - 5^2) - \frac{22}{3} (11^3 - 5^3) + \frac{1}{4} (11^4 - 5^4) \right]$$

$$\frac{169}{121} \pi \rho g (5808 - 8844 + 3504)$$

$$W = \frac{169}{121} \pi (1530)(9.8) 468 \text{ Nm}$$

10)



$$W = F D \quad D = h + 5$$

$$\frac{r}{6-h} = \frac{13}{11}$$

$$r = \frac{13}{11}(6-h)$$

$$F = ma, \quad a = g$$

$$m = (\pi r^2 dh \rho), \quad \rho = 1530 \frac{\text{kg}}{\text{m}^3}$$

$$W = \int_0^6 \pi r^2 \rho g (h+5) dh = \pi \rho g \int_0^6 (5+h) \left[\frac{13}{11}(6-h) \right]^2 dh$$

$$= \left(\frac{13}{11} \right)^2 \pi \rho g \int_0^6 (5+h) (36 - 12h + h^2) dh$$

$$= \left(\frac{13}{11} \right)^2 \pi \rho g \int_0^6 (180 - 60h + 5h^2 + 36h - 12h^2 + h^3) dh$$

$$= \left(\frac{13}{11} \right)^2 \pi \rho g \int_0^6 (180 - 24h - 7h^2 + h^3) dh$$

$$= \left(\frac{13}{11} \right)^2 \pi \rho g \left[180h - 12h^2 - \frac{7}{3}h^3 + \frac{h^4}{4} \right]_0^6$$

468

$$W = \left(\frac{13}{11} \right)^2 \pi \rho g (468) \text{ N}\cdot\text{m}$$