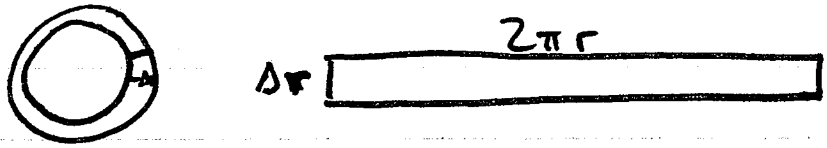
7.1

(b)



$2\pi r \, \Delta r = \text{Area}$

(c) Pop dens. = people/area

$$\underbrace{10{,}000\,(2-r)}_{\text{pop dens}} \; \underbrace{(2\pi r)\,\Delta r}_{\text{Area}}$$

(d) $\int_0^2 10{,}000\,(2-r)(2\pi r)\,dr$

mph/sec

9 (a) $\int (1+3\sqrt{t})\,dt$

$t + 2t^{3/2} + C$

$v(t) = t + 2t^{3/2}$ mph

$v(9) = 9 + 2\cdot 9^{3/2} = 63$

(b) $\int_{0/3600}^{9/3600} (t + 2t^{3/2})\,dt$ ~~mph/sec~~

$\underset{\text{Mi}}{235} \cdot \frac{1}{3600} \cdot 5280 = 344.52$

11 (a) $\int -32\,dt$

$-32t + C = v(t)$

$-32t + 90 = v(t)$

$-32(3) + 90 = v(3) = -6$ ft/sec

$s(t) = \int (-32t + 90)\,dt$

$= -16t^2 + 90t + C$ $\quad s(t) = -16t^2 + 90t$

$s(t) = -16t^2 + 90t = 0$

$t \approx 5.625$ seconds

(c) 0

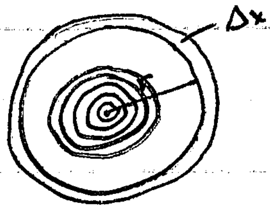
d) $\int_0^{5.625} |-32t+90|\,dt$

7.1

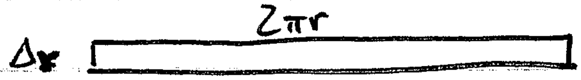
23 (a) $10{,}000(2-r)=0$ $\quad$ $\cancel{10{,}000=0}$

$2-r=0$

$r=2$ $\quad$ $2=r$



(b) $A = 2\pi r\,\Delta x$



(c) $\underbrace{10{,}000\,(2-r)}\,\underbrace{(2\pi r)\,\Delta x}$

people/sq.mi. × sq.mi. = people

(d) $\int_0^2 10{,}000(2-r)(2\pi r)\,dx \approx 83{,}776$

24 (a) $A = 2\pi r\,\Delta r$

(b) $\underbrace{8(10-r^2)}_{in/sec}(2\pi r)\,\Delta r$ $\quad in^2$ $\quad in^3/sec$

(c) $\int_0^3 8(10-r^2)(2\pi r)\,dr \approx 1244.071\ in^3/sec$

9 $\int a(t) = \int (1+3\sqrt{t})\,dt$ $\quad t^{1/2}$ $\quad \frac{3}{\frac{3}{2}}$ $\quad \cancel{3}\cdot\frac{2}{\cancel{3}} = 2$

$v(t) = t + 2t^{3/2} + C$

$v(0) = 0 + 2(0)^{3/2} + C = 0 \rightarrow C=0$

$v(t) = t + 2t^{3/2}$ $\quad$ .065 miles, 344.520 feet

$v(9) = 9 + 2(9)^{3/2} = 63$ mph

$v(t) = \frac{t}{3600} + \frac{t^{3/2}}{1800}$

(b) $v(t) = \cancel{3600t + 7200t^{3/2}}$ mps

$\cancel{\int_0^9 (3600t + 7200t^{3/2})\,dt} = \int_0^9 \left(\frac{t}{3600} + \frac{t^{3/2}}{1800}\right) dt$

7.1

11) $a(t) = -32$

$v(t) = -32t + C$

$v(0) = -32(0) + C = 90 \quad \rightarrow C = 90$

$v(t) = -32t + 90$

$v(3) = -32(3) + 90 = -6$ ft/sec (a)

$s(t) = -16t^2 + 90t = 0 \qquad t = 5.625$ sec (b)

$\int_0^{5.625} (-32t + 90)\,dt = 0$ ft (c)

$\int_0^{5.625} |-32t + 90|\,dt = 253.125$ feet

$\underline{s(5.625) - s(0)} =$ $\qquad \int_a^b f(x)\,dx = F(b) - F(a)$

18) (a) 2 + displacement $\qquad$ (b) 4m

$2 + 0 = 2$m

21) $\int_0^{10} 27.08e^{t/25}\,dt \approx 332.965$ billions of barrels

17) (a) 2 + displacement $\qquad$ (b) 4m

$2 + 4 = 6$m

7.1

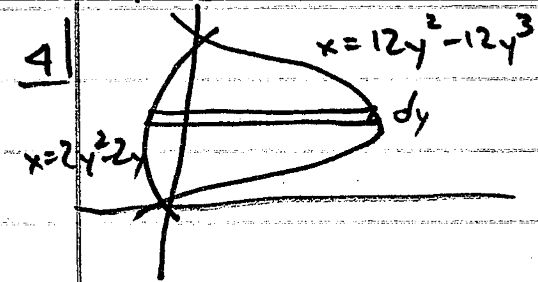
3) $v(t) = 49 - 9.8t \quad , \quad 0 \le t \le 10$

(a) stopped $t=0$, left $5 < t \le 10$, right $0 \le t < 5$

(b) $\int_0^{10} (49 - 9.8t)\, dt = 0$ $\qquad 0 + 3 = \boxed{3}$

(c) $\int_0^{10} |49 - 9.8t|\, dt = 245$ meters

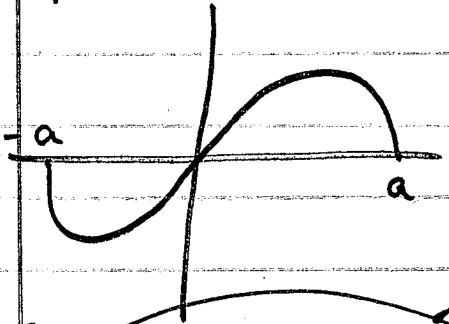
7.2

4) 

$y = 12x^2 - 12x^3$

$y = 2x^2 - 2x$

19) $y = x\sqrt{a^2 - x^2}$



$\underbrace{\int_{-a}^{0} x\sqrt{a^2-x^2}\,dx}_{\text{neg}} + \int_0^a x\sqrt{a^2-x^2}\,dx$

$\underbrace{\int_0^{-a} x\sqrt{a^2-x^2}\,dx}_{\text{positive}} + \int_0^a x\sqrt{a^2-x^2}\,dx$

$\Big|_{a^2}^{0} -\frac{1}{3}u^{3/2} + \Big|_{a^2}^{0} -\frac{1}{3}u^{3/2}$

$-\frac{1}{2}\int x (a^2 - x^2)^{1/2}\, dx \cdot -2 \quad du$

$\boxed{u = a^2 - x^2}$

$du = -2x\, dx$

$2\left[\cancel{-\frac{1}{3}(0)^{3/2}} - -\frac{1}{3}(a^2)^{3/2}\right]$

$2\left[\frac{1}{3}a^3\right] = \boxed{\frac{2}{3}a^3}$

$-\frac{1}{2}\int u^{1/2}\, du$

$-\frac{1}{\cancel{2}}\,\frac{\cancel{2}}{3}u^{3/2}$