Gavin McKay

1.A $\int_0^1 (8-(-7x+8))\,dx + \int_1^2 (8-(x^3))\,dx$

1.B $\sqrt[3]{y}=x$ $\quad -\frac{y-8}{7}=x$ $\quad$ Bounds $(1,8)$

$\sqrt[3]{1}=1$

$-\frac{1-8}{7}=1$

$$\int_1^8 \left(\sqrt[3]{y}-\left(-\frac{y-8}{7}\right)\right)dy$$

2. $\sqrt{y}=x$ $\quad \sqrt{y}=\frac{y^2}{8}$ $\quad 8\sqrt{y}=y^2$

$y(y^2-64)$ $\quad y=0,8$ $\quad 64y=y^3$

$R=(\sqrt{y}+1)^2-\left(\frac{y^2}{8}\right)^2$

$$\pi\int_0^8 (\sqrt{y}+1)^2-\left(\frac{y^2}{8}+1\right)^2 dy$$

3. A $\quad 2\pi\int_1^9 x(3-\sqrt{x})\,dx$

$y^2=x$

B. $\quad 2\pi\int_1^3 (4-y)(y^2)\,dy$

4 $\quad V(t)=10\cos(\pi t)$

$+\ \frac{1}{2}$

$$+\int_0^{1/2} 10\cos(\pi t) + -\int_{1/2}^{3/2} 10\cos \pi t$$

$\left.\frac{10\sin(\pi t)}{\pi}\right|_0^{\frac{\pi}{2}}$ $\left(\frac{10}{\pi}-0\right)+$

$-\left(\left.\frac{10\sin(\pi t)}{\pi}\right|_{1/2}^{3/2}\right)-\left(\left(\frac{-10}{\pi}\right)-\frac{10}{\pi}\right)$

$-\left(-\frac{20}{\pi}\right)$

$\frac{10}{\pi}+\frac{20}{\pi}$

$\frac{30}{\pi}$

e^{2x}

$$\int \frac{100e^{-\frac{1}{4}x}}{-\frac{1}{4}} \cdot \frac{4}{1}$$

Gavin McRoy

$$n(t) = 1500 + \int_0^t \left(100e^{-\frac{x}{4}}\right) dx$$

$$= 1500 + \left(-400e^{-1/4x}\right|_0^t -400e^{-\frac{t}{4}} - 400$$

$$n(t) = 1100 - 400e^{-\frac{t}{4}}$$

πr^2 $\quad R = 2 - e^{-x}$

$r = 1 - e^{-x}$

1. A

$$\pi \int_0^2 (2 - e^{-x})^2 - (1 - e^{-x})^2 \, dx$$

B. ~~RRRRR~~ $-\ln y = x$

$$\pi \int_0^1 (2 - (-\ln y))^2 \, dy$$

C.

$$2\pi \int_0^2 (x+2)(1 - e^{-x}) \, dx$$

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2. $f(x) = \frac{2}{3}x^{3/2} - \frac{1}{2}x^{1/2} \quad [1,9]$

$$f'(x) = x^{1/2} - \frac{1}{4\sqrt{x}}$$

$$f'(x)^2 = \left(x - \frac{1}{2} + \frac{1}{16x}\right)$$

$$= \int_1^9 \left(\sqrt{x + \frac{1}{2} + \frac{1}{16x}}\right) dx$$

$$= \int_1^9 \sqrt{\left(x^{1/2} + \frac{1}{4\sqrt{x}}\right)^2} \, dx = \int_1^9 \left(x^{1/2} + \frac{x^{-1/2}}{4}\right) dx$$

$$= \frac{2x^{\frac{3}{2}}}{3} + \frac{\sqrt{x}}{8} \Big|_1^9 \left(9 + \frac{3}{8}\right) - \left(\frac{2}{3} + \frac{1}{8}\right)$$

$$\left(\frac{72}{8} + \frac{3}{8}\right) - \left(\frac{18}{24} + \frac{3}{24}\right)$$

$$\frac{75}{8} - \frac{21}{24} = \frac{204}{24} \quad \boxed{= \frac{17}{2}}$$

4. 2J of work for .1 How much for .4

$2 = .1F \quad F = 20$

$20 = k(.1)$

$k = 200 \quad F(x) = 200x$

$W = \int_0^{.4} (200x)\,dx = 100x^2 \Big|_0^{.4} \quad 16 - 0 = \boxed{16\ J}$

25

$(5-2x)(5-2x)$

$25 - 10x - 10x + 4x^2$

$4x^2 - 20x + 25$

3. $f(x) = \sqrt{-x^2 + 5x}$

$= (-x^2 + 5x)^{1/2}$

$f'(x) = \frac{1}{2}(-x^2 + 5x)^{-\frac{1}{2}} \cdot (-2x+5)$

$f'(x) = \frac{(-2x+5)}{2(-x^2+5x)^{1/2}}$

$= \frac{5-2x}{2(5x-x^2)^{1/2}}$

$f'(x)^2 = \left(\frac{5-2x}{2(5x-x^2)^{1/2}}\right)^2 = \frac{4x^2 - 20x + 25}{20x - 4x^2}$

$2\pi \int_1^4 \sqrt{-x^2+5x} \cdot \sqrt{1 + \left(\frac{4x^2 - 20x + 25}{20x - 4x^2}\right)}\, dx$

$= 2\pi \int_1^4 \sqrt{(-x^2+5x)\left(1 + \frac{4x^2-20x+25}{20x-4x^2}\right)}\, dx$

$= 2\pi \int_1^4 \sqrt{(-x^2+5x)\left(1 + \frac{4x^2-20x+25}{4(-x^2+5x)}\right)}\, dx$

$= 2\pi \int_1^4 \sqrt{-x^2+5x + \frac{4x^2-20x+25}{4}}\, dx$

$2\pi \int_1^4 \sqrt{\frac{\cancel{-4x^2}+20x}{4} + \frac{\cancel{4x^2}-20x+25}{4}}$

$2\pi \int_1^4 \sqrt{\frac{25}{4}}\, dx = 2\pi \int_1^4 \frac{9}{2}\, dx = 2\pi\left(\frac{9}{2}x\right)\Big|_1^4 \quad 2\pi\left(18 - \frac{9}{2}\right)$

$= 2\pi\left(\frac{27}{2}\right)$

$\boxed{= 27\pi}$