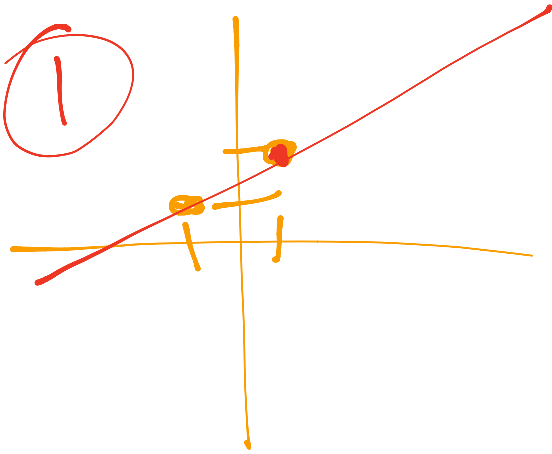
①



$f'(1) \perp$ to normal @ $(1,2)$

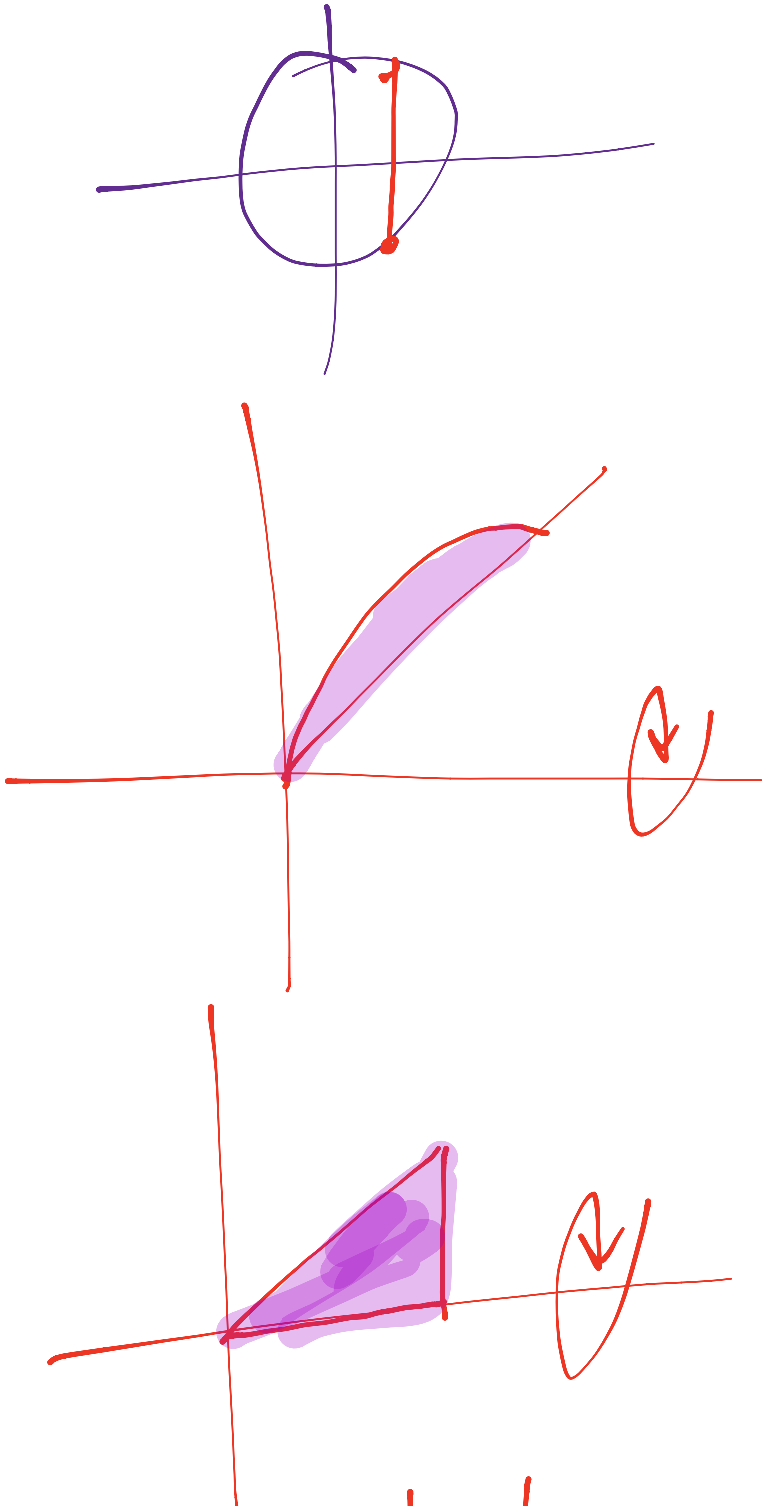
$$m_{normal} = \frac{2-1}{1--1} = \frac{1}{2}$$

$$f'(1) = -2 \qquad A$$

②
$$\cancel{8x}+4-(\cancel{8x}-6)$$
$$\frac{dy}{dx} = \frac{(2x+1)(4)-(4x-3)(2)}{(2x+1)^2}$$

$$\frac{10}{(2x+1)^2} \qquad C$$

③
$$f(x) = 1-3x^2$$
$$f'(x) = -6x$$
$$f'(1) = -6 \qquad A$$



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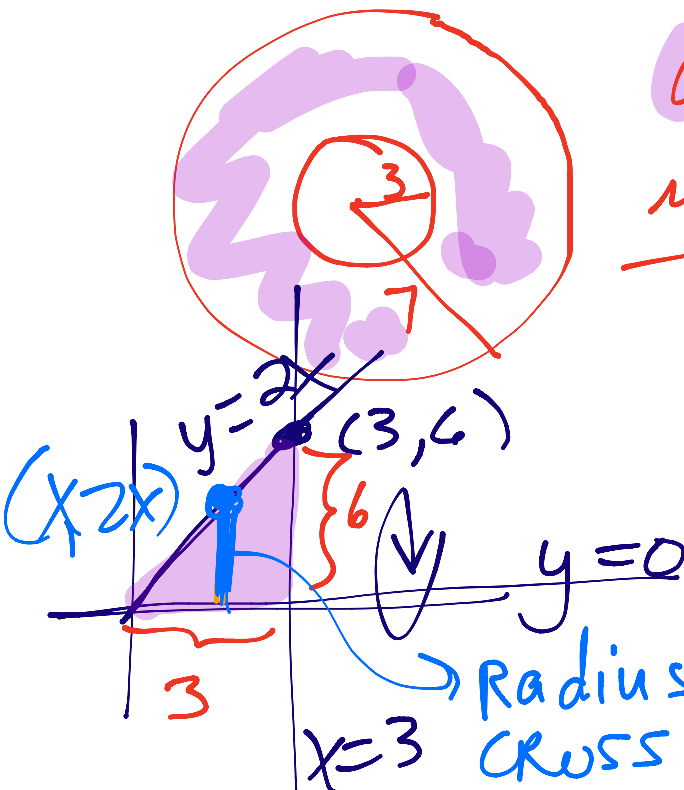


$$\text{outer} = 49\pi$$
$$\underline{\text{inner} = 9\pi}$$
$$40\pi$$

Radius of cross section
$2x$

Cone Geometry

$$\frac{1}{3}\cdot \pi r^2 \cdot h$$
$$r=6$$
$$h=3$$
$$\frac{1}{3}\cdot\pi\cdot 6^2\cdot 3$$
$$36\pi$$

Calculus

$$\int \left(\text{area of cross section}\right) dx$$

$$V = \int_0^3 \pi\cdot(2x)^2\,dx$$

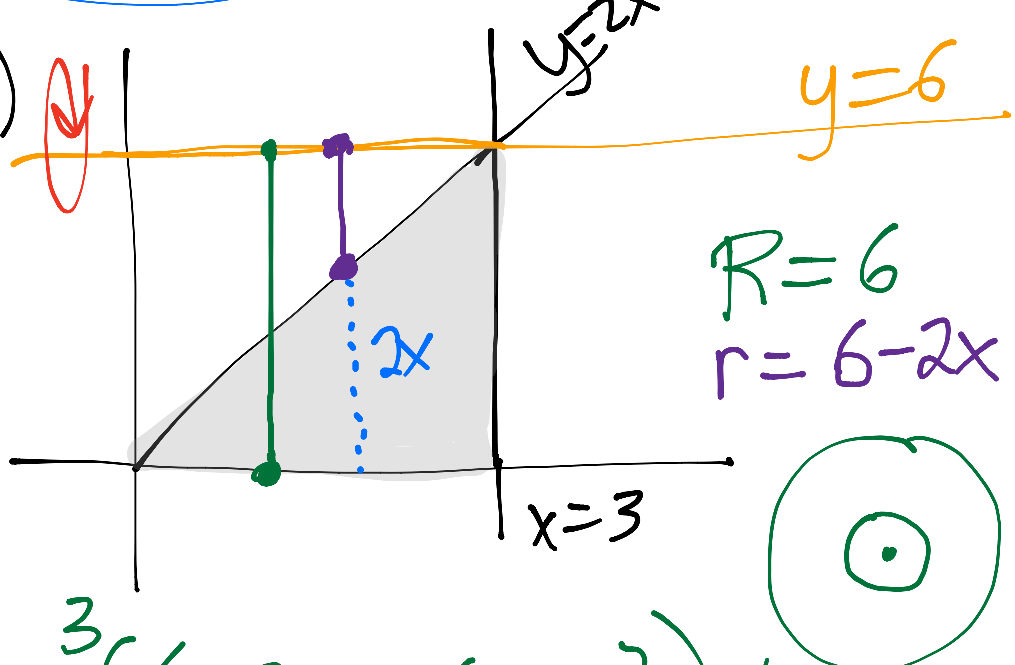
$$= 4\pi\int_0^3 x^2\,dx$$

$$= 4\pi \cdot \frac{x^3}{3}\Big|_0^3$$

$$= 4\pi \cdot \frac{3^3}{3} - 4\pi \cdot 0$$

$$= 36\pi$$

b)



$R = 6$

$r = 6-2x$

$$V = \int_0^3 \left(\pi 6^2 - \pi(6-2x)^2\right) dx$$

$$V = \pi \int_0^3 \left(36 - (36 - 24x + 4x^2)\right) dx$$

$$V = \pi \int_0^3 (24x - 4x^2)\,dx$$

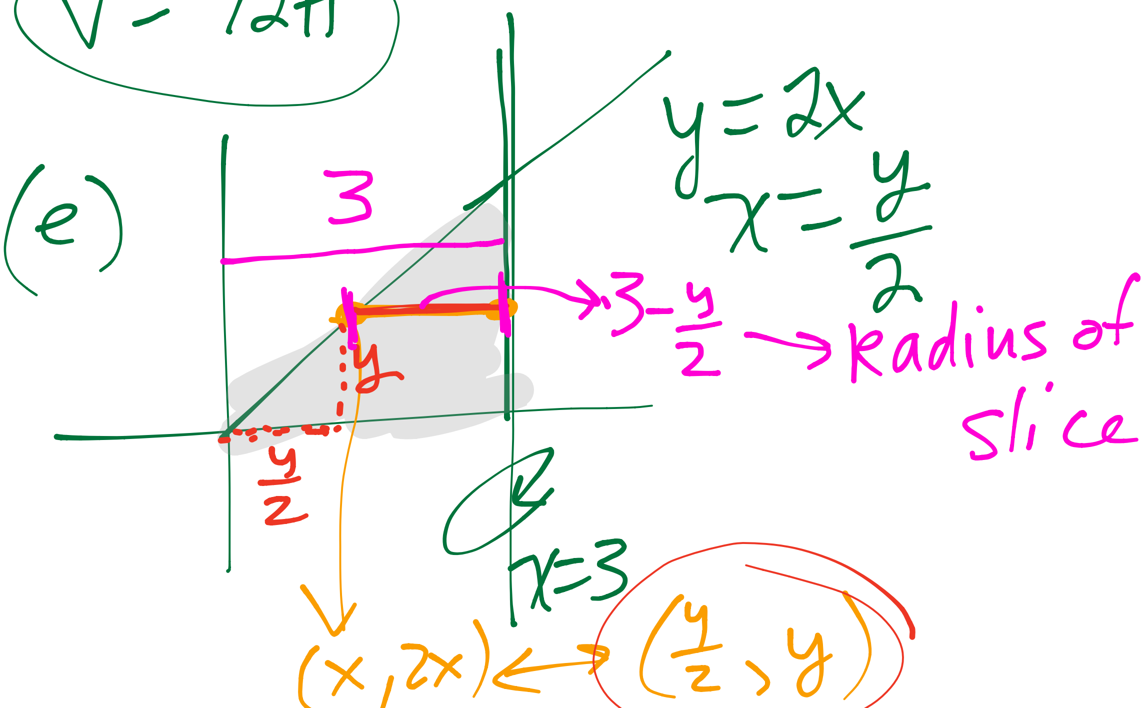
$$V = \pi \left(\frac{24x^2}{2} - \frac{4x^3}{3} \right) \Big|_0^3$$

$$V = \pi \left(12 \cdot 3^2 - \frac{4 \cdot 3^3}{3} - 0 \right)$$

$$V = \pi (108 - 36)$$

$$V = 72\pi$$

(e)



$$V=\int_0^6 \pi\left(3-\frac{y}{2}\right)^2 dy$$

$$V=\pi\int_0^6\left(9-3y+\frac{y^2}{4}\right)dy$$

$$V=\pi\left(9y-\frac{3y^2}{2}+\frac{y^3}{12}\right)\Big|_0^6$$

$$V=\pi\left(54-54+\frac{6\cdot\cancel{36}\,3}{\cancel{12}}-0\right)$$

$$V=\pi(18)$$

18π

Ex. 1 & Ex. 2 hw

Show Me (again)

Ex. 8 + 9