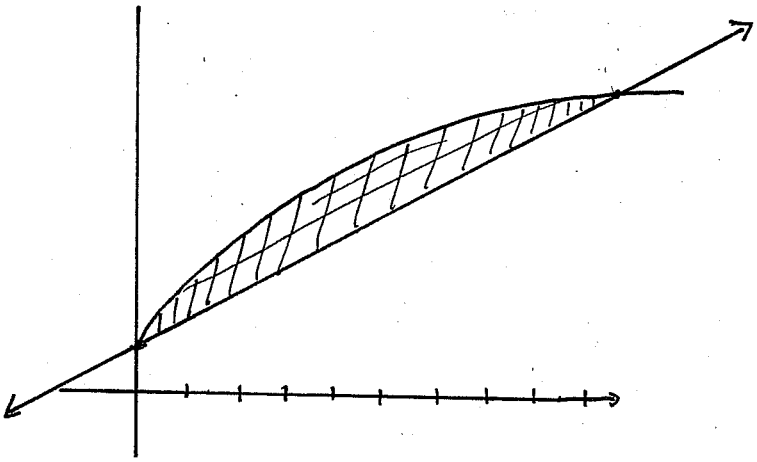
Name: Y. Lamontagne
Student ID: _____

Bonus Assignment 1

This quiz is graded out of 10 marks. No books, ~~calculators,~~ notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

§7.1 #8



Intersection:

$1+\sqrt{x} = 1+\frac{1}{3}x$

$\sqrt{x} = \frac{1}{3}x$

$(\sqrt{x})^2 = (\frac{1}{3}x)^2$

$x = \frac{1}{9}x^2$

$0 = \frac{1}{9}x^2 - x$

$0 = x(\frac{1}{9}x - 1)$

$x = 0$ or $\frac{1}{9}x - 1 = 0$

$\frac{1}{9}x = 1$

$x = 9$

$$A = \int_0^9 1+\sqrt{x} - (1+\tfrac{1}{3}x)\,dx$$

$$= \int_0^9 \sqrt{x} - \tfrac{1}{3}x\,dx$$

$$= \left[\frac{2x^{3/2}}{3} - \frac{x^2}{6}\right]_0^9$$

$$= \left[\frac{2(9)^{3/2}}{3} - \frac{9^2}{6}\right] = 18 - \frac{27}{2}$$

$$= \frac{9}{2}$$

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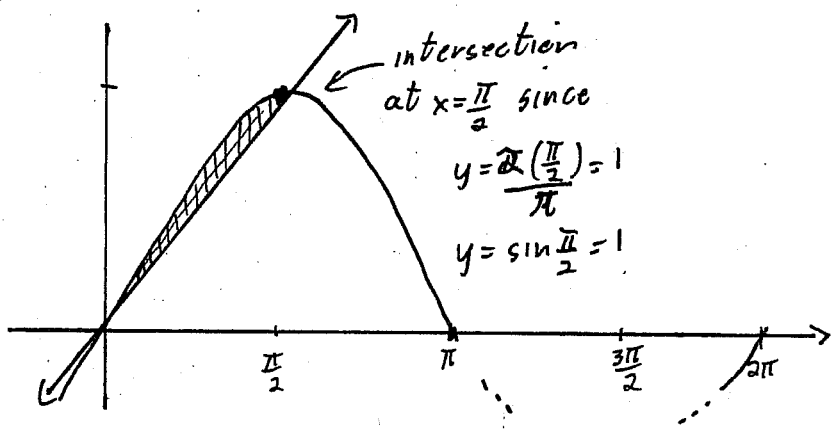
§7.1 #14



$$A = \int_0^{\pi/2} \sin x - \frac{2x}{\pi}\,dx$$

$$= \left[-\cos x - \frac{2}{\pi}\frac{x^2}{2}\right]_0^{\pi/2}$$

$$= \left[-\cos\tfrac{\pi}{2} - \tfrac{1}{\pi}(\tfrac{\pi}{2})^2\right] - \left[-\cos 0 - \tfrac{1}{\pi}0^2\right]$$

$$= 1 - \frac{\pi}{4}$$

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§7.1 #12

$4x + y^2 = 12$

$4x = -y^2 + 12$

$x = -\frac{1}{4}y^2 + 3$

Intersection:

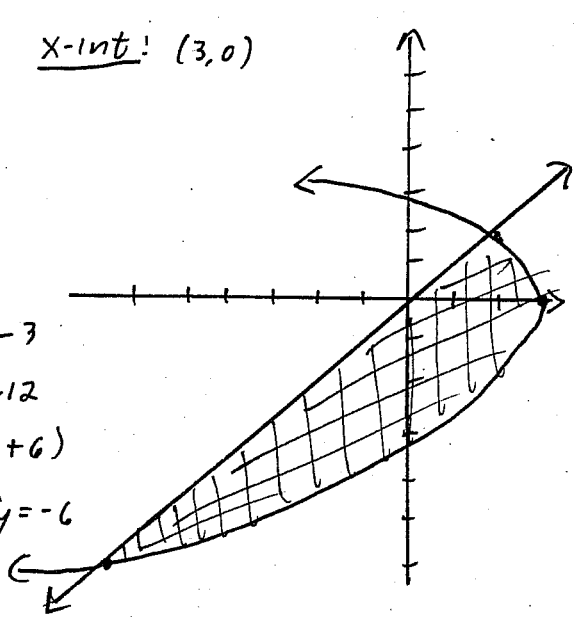
$y = -\frac{1}{4}y^2 + 3$

$0 = \frac{1}{4}y^2 + y - 3$

$0 = y^2 + 4y - 12$

$0 = (y-2)(y+6)$

$y = 2$ or $y = -6$



$$A = \int_{-6}^{2} \tfrac{-1}{4}y^2 + 3 - y\,dy$$

$$= \left[\frac{-y^3}{12} + 3y - \frac{y^2}{2}\right]_{-6}^{2}$$

$$= \left[\frac{-2^3}{12} + 3(2) - \frac{2^2}{2}\right] - \left[\frac{+(-6)^3}{12} + 3(-6) - \frac{(-6)^2}{2}\right]$$

$$= \left[\frac{-8}{12} + 6 - 2\right] - \left[18 - 18 - 18\right]$$

$$= -\frac{2}{3} + 4 + 18 = \frac{64}{3}$$

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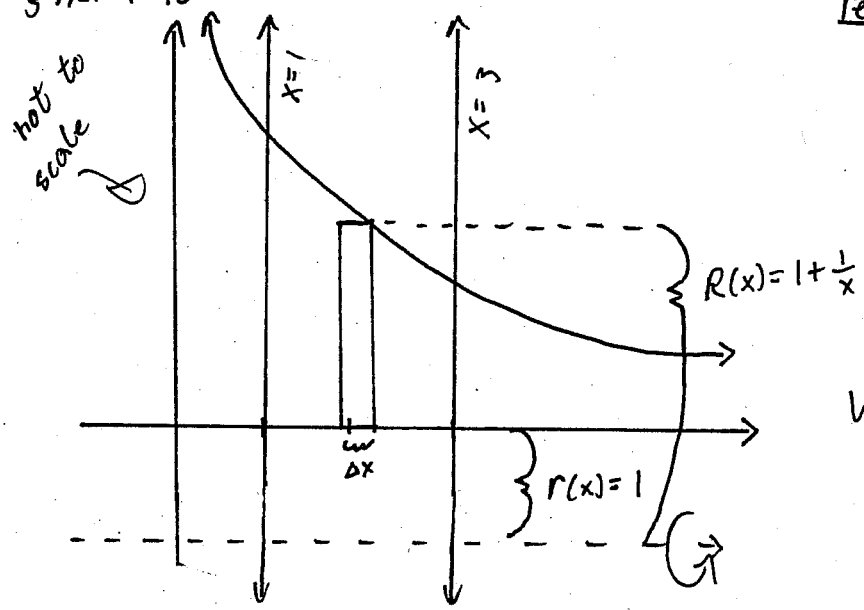
§ 7.2 # 10



rep. element:

$$\Delta V = \pi\left[(R(x))^2 - (r(x))^2\right]\Delta x$$
$$= \pi\left[\left(1+\tfrac{1}{x}\right)^2 - 1^2\right]\Delta x$$
$$= \pi\left[1 + \tfrac{2}{x} + \tfrac{1}{x^2} - 1\right]\Delta x$$
$$= \pi\left[\tfrac{1}{x^2} + \tfrac{2}{x}\right]\Delta x$$

$$V = \int_1^3 \pi\left[\tfrac{1}{x^2} + \tfrac{2}{x}\right]dx$$
$$= \pi\left[\tfrac{-1}{x} + 2\ln|x|\right]_1^3$$
$$= \pi\left[\tfrac{-1}{3} + 2\ln 3\right] - \pi\left[\tfrac{-1}{1} + 2\ln 1\right]$$
$$= \pi - \tfrac{1}{3}\pi + 2\pi\ln 3 = \tfrac{2}{3}\pi + \pi\ln 9$$

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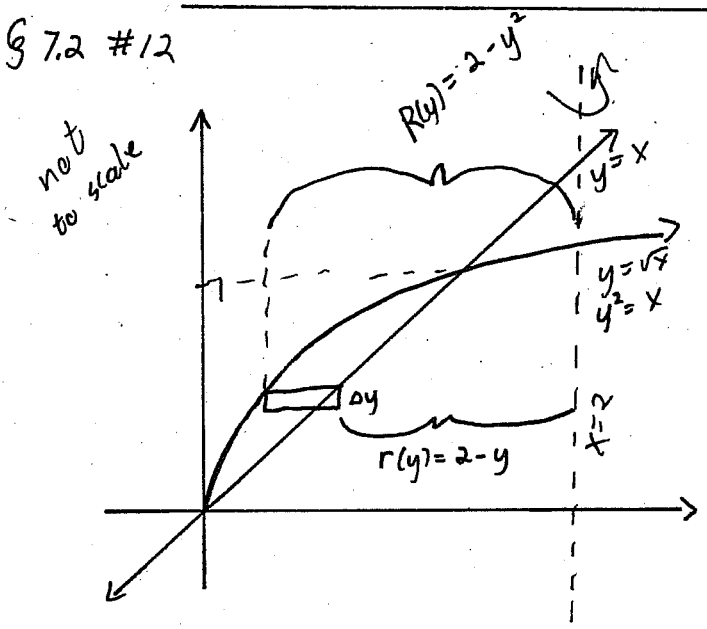
§ 7.2 #12



rep. element:

$$\Delta V = \pi\left[(R(y))^2 - (r(y))^2\right]\Delta y$$
$$= \pi\left[(2-y^2)^2 - (2-y)^2\right]\Delta y$$
$$= \pi\left[4 - 4y^2 + y^4 - 4 + 4y - y^2\right]\Delta y$$
$$= \pi\left[y^4 - 5y^2 + 4y\right]\Delta y$$

$$V = \int_0^1 \pi\left[y^4 - 5y^2 + 4y\right]dy$$
$$= \pi\left[\tfrac{y^5}{5} - \tfrac{5y^3}{3} + 2y^2\right]_0^1$$
$$= \pi\left[\tfrac{1}{5} - \tfrac{5}{3} + 2\right]$$
$$= \pi\left[\tfrac{3}{15} - \tfrac{15}{15} + \tfrac{30}{15}\right] = \tfrac{18}{15}\pi = \tfrac{6}{5}\pi$$