

Math 122 HW #6

7.5 # 7, 10, 22

7.6 # 6a, 23b

7.5 #7

Area between $y = x^2 - 30$, $y = 10 - 3x$

intersections: $x^2 - 30 = 10 - 3x$

$$x^2 + 3x - 40 = 0$$

$$(x+8)(x-5) = 0$$

$$x = 5, -8$$

try $x=0$

$$y = x^2 - 30 \rightarrow -30$$

$$y = 10 - 3x \rightarrow 10$$

$$\int_{-8}^5 (10 - 3x - (x^2 - 30)) dx = \int_{-8}^5 40 - 3x - x^2 dx$$

$$= 40x - \frac{3}{2}x^2 - \frac{x^3}{3} \Big|_{-8}^5$$

$$= 40 \cdot 5 - \frac{3}{2} \cdot 5^2 - \frac{5^3}{3} - \left(40 \cdot (-8) - \frac{3}{2} \cdot (-8)^2 - \frac{(-8)^3}{3} \right)$$

$$= 360.1\bar{6}$$

7.5 #10

$$y = x^2, y = x^3$$

$$x^2 = x^3$$

$$x^3 - x^2 = 0$$

$$x^2(x-1) = 0$$

$$x=0 \text{ or } x=1$$

try $x=1/2$: $x^2 \rightarrow 1/4$

$$x^3 \rightarrow 1/8$$

so it's $\int_0^1 x^2 - x^3 dx = \frac{x^3}{3} - \frac{x^4}{4} \Big|_0^1$

$$= \frac{1}{3} - \frac{1}{4} = .08\bar{3}$$

$$= 1/12$$

7.5 # 22

$$y = \sqrt{x} \\ = x^{1/2}$$

$$y = x\sqrt{x} \\ = x^1 \cdot x^{1/2} = x^{3/2}$$

$$x^{1/2} = x^{3/2} \\ x^{3/2} - x^{1/2} = 0$$

$$x^{1/2}(x-1) = 0$$

$$x=0, x=1$$

try $x=1/2$.

$$\sqrt{x} \rightarrow \sqrt{1/2} \leftarrow \text{bij}$$

$$x\sqrt{x} \rightarrow \frac{1}{2}\sqrt{1/2}$$

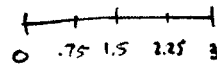
$$\int_0^1 x^{1/2} - x^{3/2} dx = \left. \frac{2}{3}x^{3/2} - \frac{2}{5}x^{5/2} \right|_0^1$$

$$= \frac{2}{3} - \frac{2}{5} = .26 \\ = 4/15$$

7.6 # 6a

$$\int_0^3 2x^3 + 1 dx$$

trap, $n=4$



$$\frac{b-a}{n} \left(\frac{1}{2}f(0) + f(.75) + f(1.5) + f(2.25) + \frac{1}{2}f(3) \right)$$

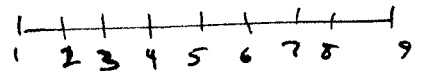
$$\frac{3}{4} \left(\frac{1}{2}(2 \cdot 0^3 + 1) + 2 \cdot .75^3 + 1 + 2 \cdot 1.5^3 + 1 + 2 \cdot 2.25^3 + 1 + \frac{1}{2}(2 \cdot 3^3 + 1) \right)$$

$$= 46.03$$

7.6 # 23b

$$y = e^{-t^2} + \frac{1}{t+1}$$

$\int_1^9 f(t) dt$ with Simpson, $n=8$.



$$\frac{b-a}{3n} \left(f(1) + 4f(2) + 2f(3) + 4f(4) + 2f(5) + 4f(6) + 2f(7) + 4f(8) + f(9) \right)$$

$$= 1.76$$