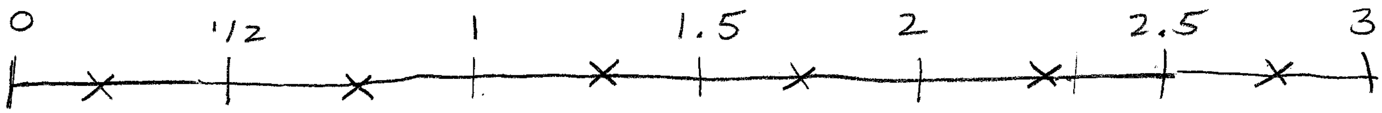
MA 131 HW # 11

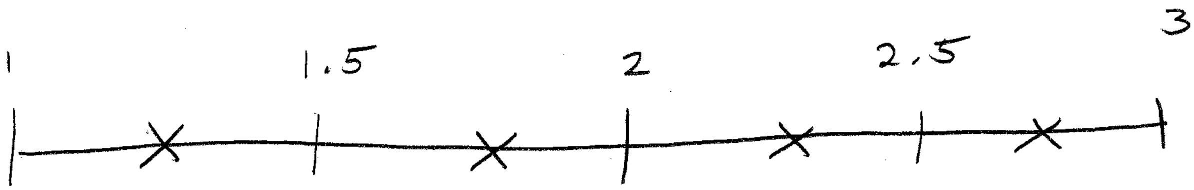
Section 6.2

2.) $\Delta x = \dfrac{3-0}{6} = 1/2$



$$\boxed{x_1 = .25 \quad x_2 = .75 \quad x_3 = 1.25 \quad x_4 = 1.75 \quad x_5 = 2.25 \quad x_6 = 2.75}$$

5.) $\Delta x = \dfrac{3-1}{4} = \dfrac{2}{4} = \dfrac{1}{2} = 0.5$



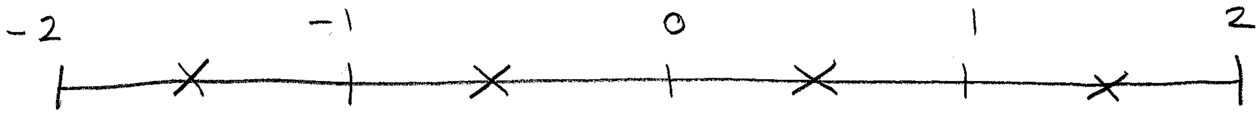
$x_1 = 1.25 \quad x_2 = 1.75 \quad x_3 = 2.25 \quad x_4 = 2.75$

$R = \Delta x \left(f(x_1) + f(x_2) + f(x_3) + f(x_4) \right)$

$\approx 0.5(1.56 + 3.06 + 5.06 + 7.56)$

$= \boxed{8.62}$

6.) $\Delta x = \dfrac{2 - -2}{4} = \dfrac{4}{4} = 1$

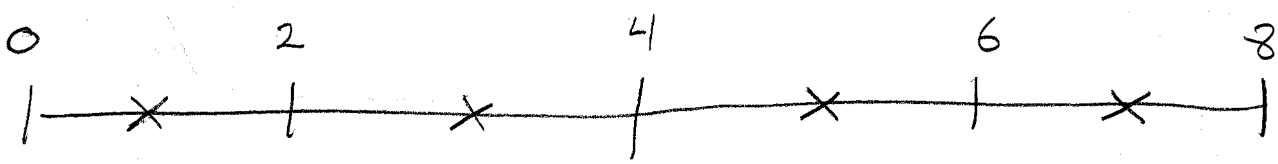


$x_1 = -1.5 \quad x_2 = -.5 \quad x_3 = 0.5 \quad x_4 = 1.5$

$R = 1 \cdot \left((-1.5)^2 + (-.5)^2 + (.5)^2 + (1.5)^2\right)$

$= \boxed{5}$

11.) $\Delta x = \dfrac{8-0}{4} = 2$



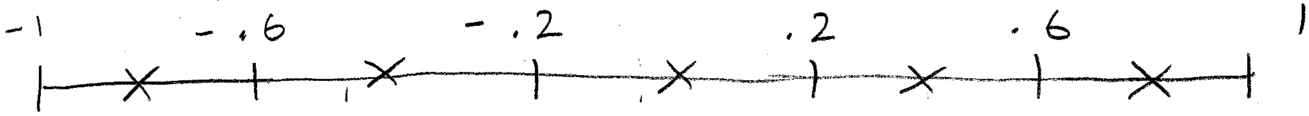
$x_1 = 1 \quad x_2 = 3 \quad x_3 = 5 \quad x_4 = 7$

$R = 2 \cdot \left(f(x_1) + f(x_2) + f(x_3) + f(x_4)\right)$

$= 2 \cdot (4 + 8 + 6 + 2)$

$= 2 \cdot 20 = \boxed{40}$

17.) $\Delta x = \frac{1 - -1}{5} = \frac{2}{5} = .4$



$x_1 = -.8 \qquad x_2 = -.4 \qquad x_3 = 0 \qquad x_4 = .4 \qquad x_5 = .8$

$$A \approx .4\left(\sqrt{1-(-.8)^2} + \sqrt{1-(-.4)^2} + \sqrt{1} + \sqrt{1-(.4)^2} + \sqrt{1-(.8)^2}\right)$$

$$= \boxed{1.61321}$$

$$\boxed{\text{Error} = 1.61321 - 1.57080 = 0.04241}$$

20.) $A \approx 40(106 + 101 + 100 + 113)$

$$= 40(420) = \boxed{16,800}$$

Section 6.3

2.) $\boxed{A = \int_1^3 (x + 1/x)\,dx}$

8.) $\int_0^1 (x + 1/2)\,dx = \frac{1^2}{2} + \frac{1}{2} - \left(\frac{0^2}{2} + \frac{0}{2}\right)$

$$= 1/2 + 1/2$$

$$= \boxed{1}$$

$f(x) = x + 1/2$

$F(x) = \frac{x^2}{2} + \frac{x}{2}$

10.) $\int_1^4 x^2\sqrt{x}\,dx = \frac{2}{7}\left(4^{7/2} - 1^{7/2}\right) = \boxed{\frac{254}{7}}$

$f(x) = x^2\sqrt{x}$

$= x^2 x^{1/2}$

$= x^{5/2}$

$F(x) = \frac{2}{7}x^{7/2}$

12.) $\int_0^1 (4x^3 - 1)\,dx = 1^4 - 1 - (0^4 - 0)$

$= 1 - 1 = \boxed{0}$

$f(x) = 4x^3 - 1$

$F(x) = x^4 - x$

14.) $\int_0^1 2e^{2x}\,dx = e^{2\cdot 1} - e^{2\cdot 0} = \boxed{e^2 - 1}$

$f(x) = 2e^{2x}$

$F(x) = e^{2x}$

18.) $\displaystyle\int_{\ln 2}^{\ln 3} \frac{3}{e^{3t}}\,dt = -e^{-3\ln 3} + e^{-3\ln 2}$

$= -\left(e^{\ln 3}\right)^{-3} + \left(e^{\ln 2}\right)^{-3}$

$f(t) = 3e^{-3t}$

$F(t) = -e^{-3t}$

$= -(3)^{-3} + (2)^{-3}$

$= -\dfrac{1}{3^3} + \dfrac{1}{2^3} = \dfrac{-1}{27} + \dfrac{1}{8}$

$= \dfrac{-8+27}{8\cdot 27} = \boxed{\dfrac{19}{216}}$

22.) $\displaystyle\int_1^2 \left(\frac{x}{2} + \frac{2}{x} + \frac{1}{2x^2}\right)dx = \frac{2^2}{4} + 2\ln 2 - \frac{1}{4}$

$- \left(\dfrac{1^2}{4} + 2\ln 1 - \dfrac{1}{2}\right)$

$f(x) = \dfrac{x}{2} + \dfrac{2}{x} + \dfrac{1}{2x^2}$

$F(x) = \dfrac{x^2}{4} + 2\ln x - \dfrac{1}{2x}$

$= 1 + 2\ln 2 - 1/4 - 1/4$

$- 2\ln 1 + 1/2$

$= \boxed{1 + 2\ln 2}$

26.) $\displaystyle\int_0^1 \left(e^{x/3} - \frac{2x}{5}\right)dx = 3e^{1/3} - \frac{1^2}{5} - \left(3e^{0/3} - \frac{0^2}{5}\right)$

$= 3\sqrt[3]{e} - \dfrac{1}{5} - 3$

$f(x) = e^{x/3} - \dfrac{2x}{5}$

$F(x) = 3e^{x/3} - \dfrac{x^2}{5}$

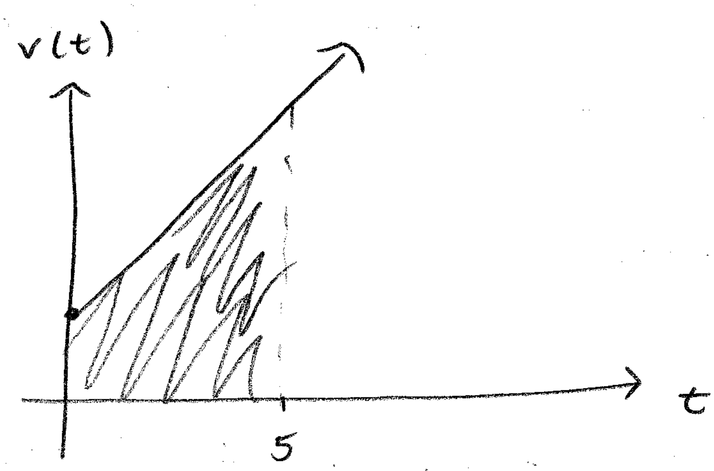
$= \boxed{3\sqrt[3]{e} - 16/5}$

36.) $\int_0^7 g(x)dx$ is negative since there is more area below the x-axis than above

38.) $\int_5^7 p(t)dt$ is the total amound of pollutant discharged in the lake from 1995 to 1997

39. a) $$\int_0^5 (2t+1)dt = 5^2 + 5 - (0^2+0)$$
$$= 25 + 5$$
$$= \boxed{30 \text{ ft}}$$

b)



40. a) $\int_2^5 \left(21 - \frac{4t}{5}\right)dt = 21\cdot5 - \frac{2\cdot5^2}{5} - \left(21(2) - \frac{2(2)^2}{5}\right)$

$f(t) = 21 - \frac{4t}{5}$

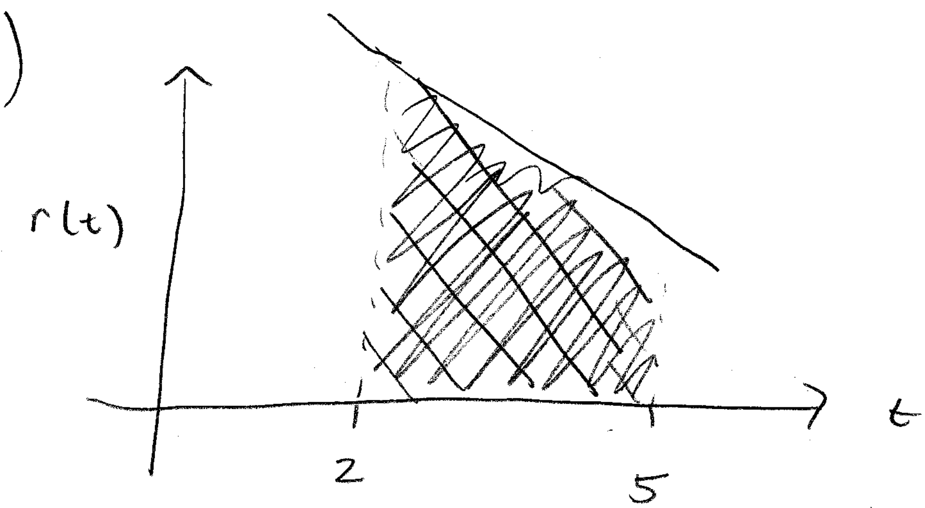
$F(t) = 21t - \frac{2t^2}{5}$

$= 105 - 10 - 42 + \frac{8}{5}$

$= 53 + 8/5$

$= 54.6$ $\boxed{54 \text{ mowers}}$

b.)



42. a) $\int_5^8 (100 + 50x - 3x^2)dx$

$= 100(8) + 50\frac{8^2}{2} - 8^3 - \left(100(5) + 50\frac{5^2}{2} - 5^3\right)$

$= 888$ dollars

b) It's the area between the graph of $y = 100 + 50x - 3x^2$ and the x-axis from $x = 5$ to $x = 8$

47.) $\int_{0}^{20} 76.2e^{.03t} = 76.2\left(\frac{e^{.03 \cdot 20}}{.03} - \frac{e^{.03 \cdot 0}}{.03}\right)$

$\approx \boxed{2088 \text{ million } m^3}$