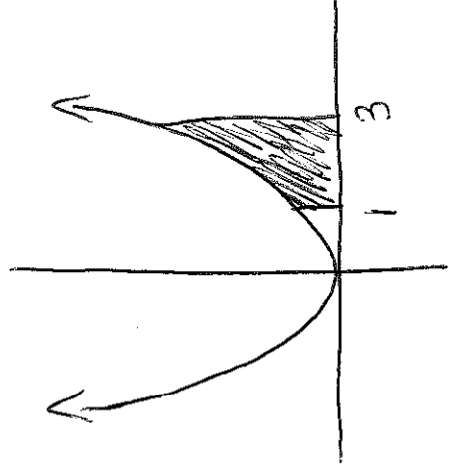


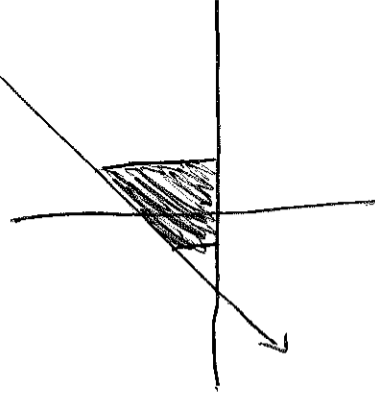
Written Exercises 9.1

1. $f(x) = x^2$, $x=1$, $x=3$



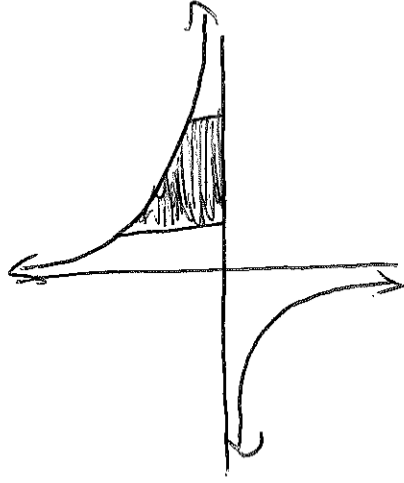
$$\begin{aligned}
 A &= \int_1^3 x^2 dx = \frac{1}{3} x^3 \Big|_1^3 \\
 &= \frac{1}{3} (3)^3 - \frac{1}{3} (1)^3 \\
 &= 9 - \frac{1}{3} \\
 &= \frac{26}{3} \text{ u}^2
 \end{aligned}$$

2. $f(x) = 2x+4$, $x=-1$, $x=1$



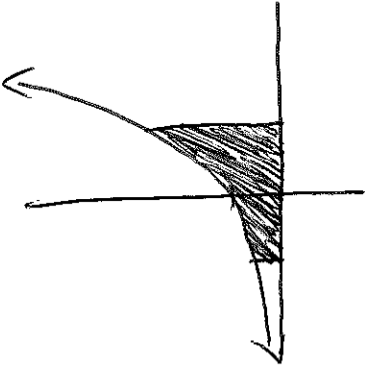
$$\begin{aligned}
 A &= \int_{-1}^1 (2x+4) dx = x^2 + 4x \Big|_{-1}^1 \\
 &= (1)^2 + 4(1) - \left[(-1)^2 + 4(-1) \right] \\
 &= 5 - (-3) \\
 &= 8 \text{ u}^2
 \end{aligned}$$

3. $f(x) = \frac{1}{x}$, $x=2$, $x=6$



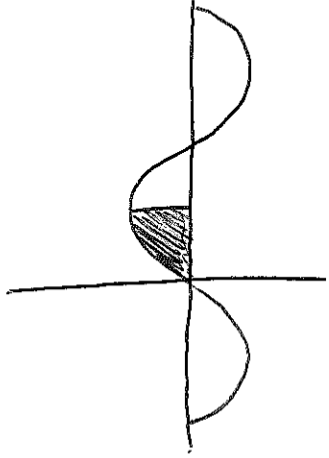
$$\begin{aligned}
 A &= \int_2^6 \frac{1}{x} dx = \ln x \Big|_2^6 \\
 &= \ln 6 - \ln 2 \\
 &= \ln\left(\frac{6}{2}\right) = \ln 3 \text{ u}^2
 \end{aligned}$$

4. $f(x) = e^x$, $x = -2$, $x = 2$



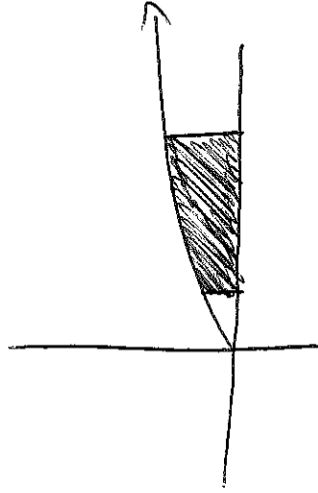
$$A = \int_{-2}^2 e^x dx = e^x \Big|_{-2}^2 = e^2 - e^{-2} = \left(e^2 - \frac{1}{e^2}\right) u^2$$

5. $f(x) = \sin x$, $x = 0$, $x = \frac{\pi}{2}$



$$A = \int_0^{\pi/2} \sin x dx = -\cos x \Big|_0^{\pi/2} = -\cos\left(\frac{\pi}{2}\right) - (-\cos 0) = -0 - (-1) = 1$$

6. $f(x) = \sqrt{x}$, $x = 1$, $x = 4$

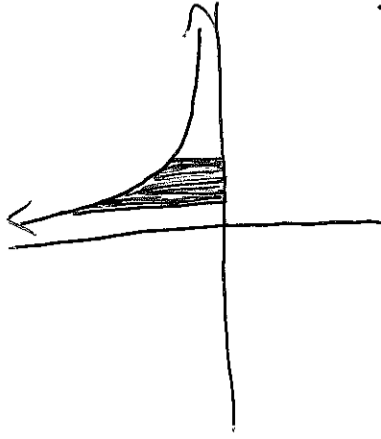


$$x^{\frac{3}{2}} = (\sqrt{x})^3$$

$$A = \int_1^4 \sqrt{x} dx = \int_1^4 x^{\frac{1}{2}} dx = \frac{2}{3} x^{\frac{3}{2}} \Big|_1^4$$

$$A = \frac{2}{3} [(\sqrt{4})^3 - (\sqrt{1})^3] = \frac{2}{3} [8 - 1] = \frac{2}{3} (7) = \frac{14}{3} u^2$$

$$7. f(x) = x^{-3}, \quad x = \frac{1}{2}, x = 1$$

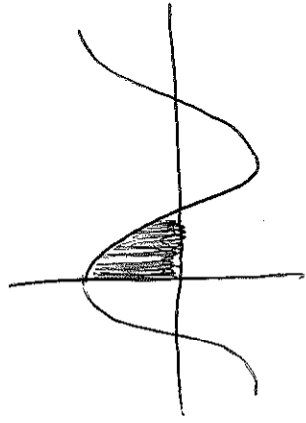


$$A = \int_{\frac{1}{2}}^1 x^{-3} dx = \left. -\frac{1}{2} x^{-2} \right|_{\frac{1}{2}}^1$$

$$= -\frac{1}{2} \left[(1)^{-2} - \left(\frac{1}{2}\right)^{-2} \right] = -\frac{1}{2} (1 - 4)$$

$$= \frac{3}{2} u$$

$$8. f(x) = \cos 2x, \quad x = 0, x = \frac{\pi}{4}$$



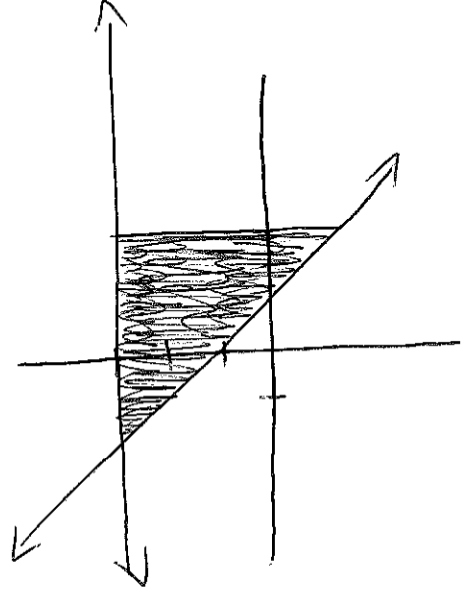
$$A = \int_0^{\pi/4} \cos 2x = \left. \frac{1}{2} \sin 2x \right|_0^{\pi/4}$$

$$= \frac{1}{2} \left[\sin\left(2 \cdot \frac{\pi}{4}\right) - \sin(2 \cdot 0) \right] = \frac{1}{2} (\sin \frac{\pi}{2} - \sin 0)$$

$$= \frac{1}{2} (1 - 0) = \frac{1}{2} u^2$$

Written Exercises 9.3

1. $y = 3$, $y = 1 - x$, $x = -1$, $x = 2$

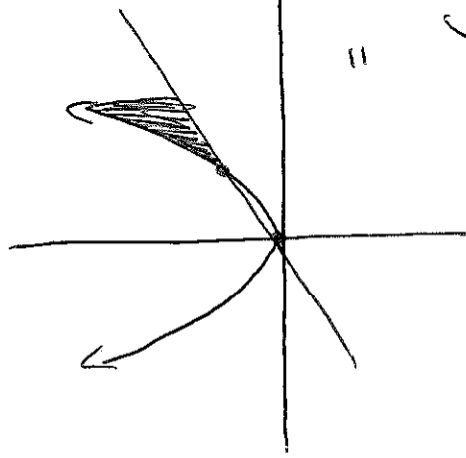


$$A = \int_{-1}^2 [3 - (1-x)] dx = \int_{-1}^2 (2+x) dx$$

$$= \left[2x + \frac{1}{2}x^2 \right]_{-1}^2 = \left[2(2) + \frac{1}{2}(2)^2 \right] - \left[2(-1) + \frac{1}{2}(-1)^2 \right]$$

$$= (4+2) - \left(-2 + \frac{1}{2}\right) = 6 - \left(-\frac{3}{2}\right) = \frac{15}{2} u^2$$

3. $y = x$, $y = x^2$, $x = 1$, $x = 2$



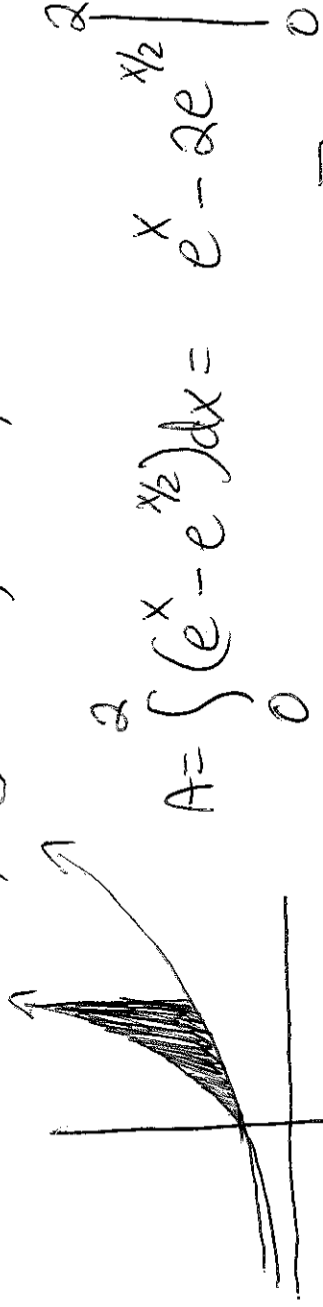
$$A = \int_1^2 (x^2 - x) dx = \left[\frac{1}{3}x^3 - \frac{1}{2}x^2 \right]_1^2$$

$$= \left[\frac{1}{3}(2)^3 - \frac{1}{2}(2)^2 \right] - \left[\frac{1}{3}(1)^3 - \frac{1}{2}(1)^2 \right]$$

$$= \left(\frac{8}{3} - 2 \right) - \left(\frac{1}{3} - \frac{1}{2} \right) = \frac{2}{3} - \left(-\frac{1}{6} \right)$$

$$= \frac{5}{6} u^2$$

5. $y = e^x$, $y = e^{x/2}$, $x=0$, $x=2$



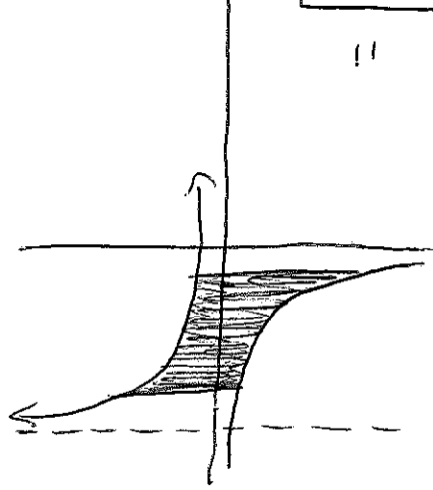
$$A = \int_0^2 (e^x - e^{x/2}) dx = e^x - 2e^{x/2} \Big|_0^2$$

$$= [e^2 - 2e^{2/2}] - [e^0 - 2e^{0/2}]$$

$$= e^2 - 2e - [1 - 2]$$

$$= e^2 - 2e + 1$$

7. $y = \frac{1}{x}$, $y = \frac{1}{x+4}$, $x=-3$, $x=-1$



$$A = \int_{-3}^{-1} \left(\frac{1}{x+4} - \frac{1}{x} \right) dx = \ln|x+4| - \ln|x| \Big|_{-3}^{-1}$$

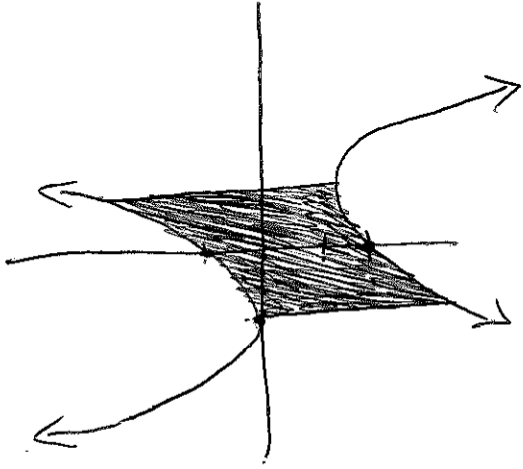
$$= [\ln|-1+4| - \ln|-1|] - [\ln|-3+4| - \ln|-3|]$$

$$= \ln 3 - \ln 1 - [\ln 1 - \ln 3]$$

$$= 2\ln 3 - 2\ln 1$$

$$= 2\ln 3$$

9. $y = x^2 + 2x + 1$, $y = -x^2 + 2x - 2$, $x = -1$, $x = 1$



$$A = \int_{-1}^1 (x^2 + 2x + 1) - (-x^2 + 2x - 2) dx$$

$$= \int_{-1}^1 2x^2 + 3 dx = \left[\frac{2}{3}x^3 + 3x \right]_{-1}^1$$

$$= \left[\frac{2}{3}(1)^3 + 3(1) \right] - \left[\frac{2}{3}(-1)^3 + 3(-1) \right]$$

$$= \left(\frac{2}{3} + 3 \right) - \left(-\frac{2}{3} - 3 \right) = \frac{11}{3} - \left(-\frac{11}{3} \right) = \frac{22}{3} u^2$$