Section 5.2 Exercises

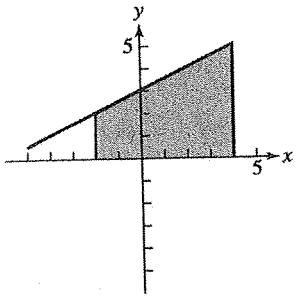
1. $\lim_{n\to\infty}\sum_{k=1}^{n}(c_k)^2\Delta x_k = \int_0^2 x^2\,dx$ where n is any partition of $[0, 2]$.

3. $\lim_{n\to\infty}\sum_{k=1}^{n}\frac{1}{c_k}\Delta x_k = \int_1^4 \frac{1}{x}\,dx$ where n is any partition of $[1, 4]$.

7. $\int_{-2}^{1} 5\,dx = 5[1-(-2)] = 15$

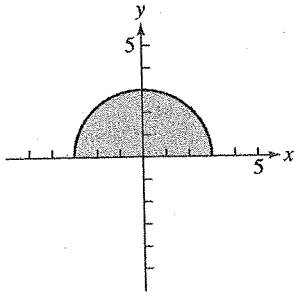
9. $\int_0^3 (-160)\,dt = (-160)(3-0) = -480$

13. Graph the region under $y = \frac{x}{2}+3$ for $-2 \le x \le 4$.



$$\int_{-2}^{4}\left(\frac{x}{2}+3\right)dx = \frac{1}{2}(6)(2+5) = 21$$

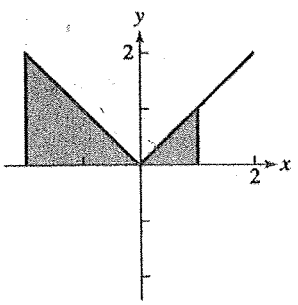
15. Graph the region under $y = \sqrt{9-x^2}$ for $-3 \le x \le 3$.



This region is half of a circle radius 3.

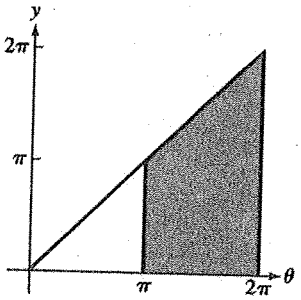
$$\int_{-3}^{3}\sqrt{9-x^2}\,dx = \frac{1}{2}\pi(3)^2 = \frac{9\pi}{2}$$

17. Graph the region under $y = |x|$ for $-2 \le x \le 1$.



$$\int_{-2}^{1}|x|\,dx = \frac{1}{2}(2)(2)+\frac{1}{2}(1)(1) = \frac{5}{2}$$

21. Graph the region under $y = \theta$ for $\pi \le \theta \le 2\pi$



$$\int_{\pi}^{2\pi}\theta\,d\theta = \frac{1}{2}(2\pi-\pi)(2\pi+\pi) = \frac{3\pi^2}{2}$$

Day 2

23. $\int_0^b x\,dx = \frac{1}{2}(b)(b) = \frac{1}{2}b^2$

25. $\int_a^b 2s\,ds = \frac{1}{2}(b-a)(2b+2a) = b^2-a^2$

29. $\int_8^{11} 87\,dt = 87t\Big|_8^{11}$

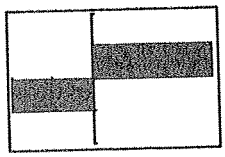
$87(11)-87(8) = 261$ miles

33. $\text{NINT}\left(\frac{x}{x^2+4}, x, 0, 5\right) \approx 0.9905$

35. $\text{NINT}(4-x^2, x, -2.2) \approx 10.6667$

37. (a) The function has a discontinuity at $x = 0$.

(b)

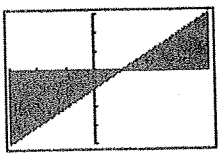


$[-2, 3]$ by $[-2, 2]$

$$\int_{-2}^{3}\frac{x}{|x|}\,dx = -2+3 = 1$$

39. (a) The function has a discontinuity at $x = -1$.

(b)



$[-3, 4]$ by $[-4, 3]$

$$\int_{-3}^{4}\frac{x^2-1}{x+1}\,dx = -\frac{1}{2}(4)(4)+\frac{1}{2}(3)(3) = -\frac{7}{2}$$