Problems for Section 5.1

3. A car comes to a stop six seconds after the driver applies the brakes. While the brakes are on, the velocities recorded are in Table 5.4.

Table 5.4

Time since brakes applied (sec)	0	2	4	6
Velocity (ft/sec)	88	45	16	0

(a) Give lower and upper estimates for the distance the car traveled after the brakes were applied.
(b) On a sketch of velocity against time, show the lower and upper estimates of part (a).

5. The velocity of a car is $f(t) = 5t$ meters/sec. Use a graph of $f(t)$ to find the exact distance traveled by the car, in meters, from $t = 0$ to $t = 10$ seconds.

11. A village wishes to measure the quantity of water that is piped to a factory during a typical morning. A gauge on the water line gives the flow rate (in cubic meters per hour) at any instant. The flow rate is about 100 m^3/hr at 6 am and increases steadily to about 280 m^3/hr at 9 am. Using only this information, give your best estimate of the total volume of water used by the factory between 6 am and 9 am.

15. Two cars start at the same time and travel in the same direction along a straight road. Figure 5.11 gives the velocity, v, of each car as a function of time, t. Which car:

(a) Attains the larger maximum velocity?
(b) Stops first?
(c) Travels farther?

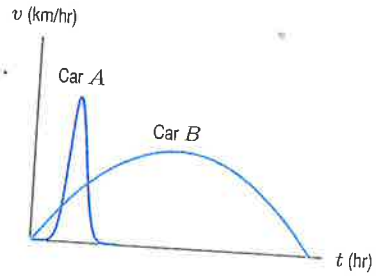


Figure 5.11

19. The value of a mutual fund increases at a rate of $R = 500e^{0.04t}$ dollars per year, with t in years since 2010.

(a) Using $t = 0, 2, 4, 6, 8, 10$, make a table of values for R.
(b) Use the table to estimate the total change in the value of the mutual fund between 2010 and 2020.

Problems for Section 5.2

Homework #16
Math 211

1. Estimate $\int_0^6 2^x\,dx$ using a left-hand sum with $n = 2$.

5. Use the following table to estimate $\int_0^{15} f(x)\,dx$.

x	0	3	6	9	12	15
$f(x)$	50	48	44	36	24	8

18. Using Figure 5.24, find the value of $\int_1^6 f(x)\,dx$.

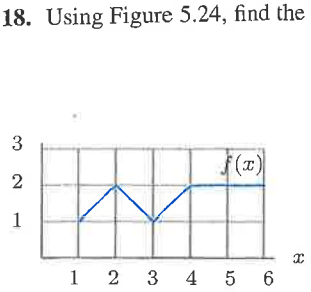


Figure 5.24

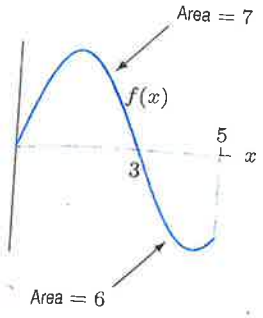


Figure 5.34

Problems for Section 5.3

5. **(a)** What is the area between the graph of $f(x)$ in Figure 5.34 and the x-axis, between $x = 0$ and $x = 5$?
(b) What is $\int_0^5 f(x)\,dx$?

13. Given $\int_{-2}^{0} f(x)dx = 4$ and Figure 5.38, estimate:

(a) $\int_0^2 f(x)dx$ **(b)** $\int_{-2}^{2} f(x)dx$
(c) The total shaded area.

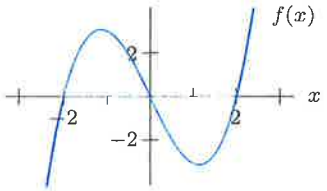


Figure 5.38

18. Use Figure 5.39 to find the values of

(a) $\int_a^b f(x)\,dx$ **(b)** $\int_b^c f(x)\,dx$
(c) $\int_a^c f(x)\,dx$ **(d)** $\int_a^c |f(x)|\,dx$

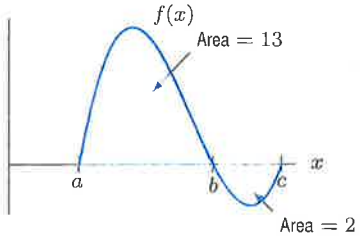
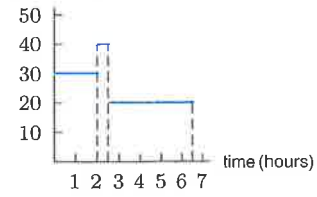


Figure 5.39

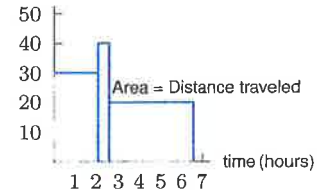
Solutions

Section 5.1

1 (a) velocity (miles/hour)

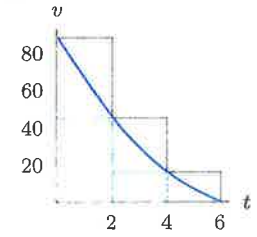


(b) velocity (miles/hour)



3 (a) Lower estimate = 122 ft
Upper estimate = 298 ft

(b)



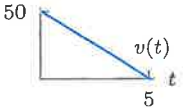
5 250 meters

7 $\approx$ 455 feet or 0.086 miles

9 (a) About 420 kg
(b) 336 and 504 kg

11 (a) 570 m^3
(b) Every 2 minutes

13 (a)



(b) 125 feet
(c) 4 times as far

15 (a) Car A
(b) Car A
(c) Car B

17 60 m (Other answers possible.)

19 (b) \$6151

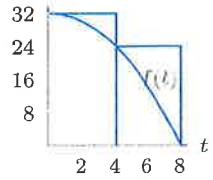
Section 5.2

1 27

3 1692.5

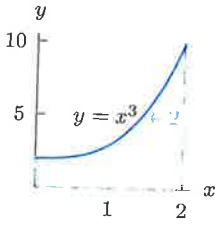
5 About 543

7 (a) 224



Section 5.3

1 8



3 $\int_0^2 ((x+5) - (2x+1))\,dx = 6$

5 (a) 13
(b) 1

7 Positive

9 Positive

11 -40

13 (a) -4
(b) 0
(c) 8

15 II

17 III

19 V < IV < II < III < I
I, II, III positive
IV, V negative

Section 5.2
#18: 8.5

Section 5.3
#18 a) 13
b) -2
c) 11
d) 15