

**From Section 5.4:**

The Net Change of  $F(x)$  between  $x = a$  and  $x = b$  is difference between  $F(b)$  (the ending value) and  $F(a)$  (the initial value). The Net Change Theorem says that the net change of a function  $F(x)$  for  $x$  in an interval  $[a, b]$  is the integral of  $F'(x)$  from  $a$  to  $b$ . I.e.

$$\text{Net Change of } F = \int_a^b F'(x)dx.$$

These problems are from page 412.

45. If  $w'(t)$  is the rate of growth of a child in pounds per year, what does  $w(t)$  represent about the child? What does  $\int_5^{10} w'(t)dt$  represent about the child?

46. The current  $I(t)$  in a wire at time  $t$  is defined as the derivative (rate of change) of the charge  $Q(t)$ :  $I(t) = Q'(t)$ . What does  $\int_a^b I(t)dt$  represent about the wire?

47. If oil leaks from a tank at a rate of  $r(t)$  gallons per minute at time  $t$ , what about the oil in the tank is  $r$  the derivative of? What does  $\int_0^{120} r(t)dt$  represent about the oil?

48. A honeybee population starts with 100 bees and increases at a rate of  $n'(t)$  bees per week. What does the function  $n(t)$  represent about the bees? What does  $100 + \int_0^1 5n'(t)dt$  represent about the bees?

**From Section 6.5:**

The average value of a function on an interval  $[a, b]$  is given by  $ave(f) = \frac{1}{b-a} \int_a^b f(x)dx$ . The constant function  $g(x) = ave(f)$  has the same integral as  $f$  on the interval  $[a, b]$ .

These problems are from page 467.

5. Find the average value of the function  $f(t) = te^{-t^2}$  on the interval  $[0, 5]$ .

7. Find the average value of the function  $h(x) = \cos^4(x) \sin(x)$  on the interval  $[0, \pi]$ .

8. Find the average value of the function  $h(r) = \frac{3}{1+r^2}$  on the interval  $[0, \pi]$ .

If  $f$  is an odd function, what is the average value of  $f$  from  $-a$  to  $a$ ?

18. If a cup of coffee has temperature of  $95^\circ\text{C}$  in a room where the temperature is  $20^\circ\text{C}$ , then, according to Newton's Law of Cooling, the temperature of the coffee after  $t$  minutes is

$$T(t) = 20 + 75e^{-t/50}.$$

What is the average temperature of the coffee during the first half hour?

**From Section 6.1:**

- a. Sketch the region enclosed by the given curves.
- b. Draw a typical approximating rectangle and label its height and width.
- c. Find the area of the region.

These problems are from page 442.

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

6.  $y = \sin(x)$ ,  $y = e^x$ ,  $x = 0$ ,  $x = \pi/2$ .

7.  $y = x$ ,  $y = x^2$ .