In Problems 1–18 use Definition 7.1.1 to find $\mathscr{L}\{f(t)\}$.

1.
$$f(t) = \begin{cases} -1, & 0 \le t < 1 \\ 1, & t \ge 1 \end{cases}$$

4.
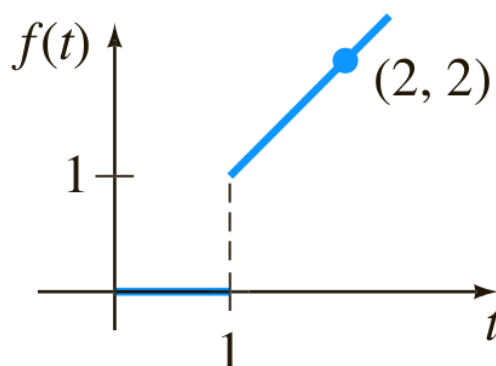$$f(t) = \begin{cases} 2t + 1, & 0 \le t < 1 \\ 0, & t \ge 1 \end{cases}$$

7.

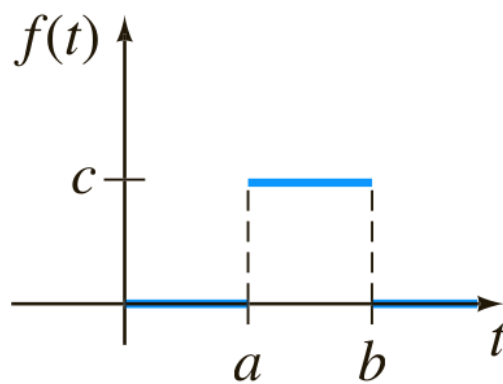Figure 7.1: Graph for Problem 7

10.

Figure 7.2: Graph for Problem 10

In Problems 19–37 use Theorem 7.1.1 to find $\mathscr{L}\{f(t)\}$.

19.
$$f(t) = 2t^4$$

23.
$$f(t) = t^2 + 6t - 3$$

24.
$$f(t) = -4t^2 + 16t + 9$$

25.
$$f(t) = (t + 1)^3$$

30.
$$f(t) = (e^t - e^{-t})^2$$

31.
$$f(t) = 4t^2 - 5\sin(3t)$$

33.
$$f(t) = \sinh(kt)$$

35.
$$f(t) = e^t \sinh(t)$$