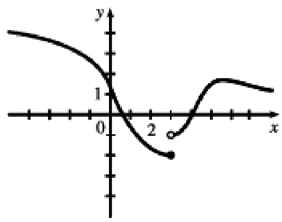
1. From Definition 1, $\lim_{x\to 4} f(x) = f(4)$.

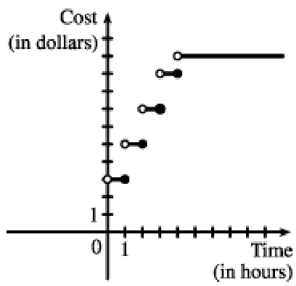
3. (a) The following are the numbers at which f is discontinuous and the type of discontinuity at that number: -4 (removable), -2 (jump), 2 (jump), 4 (infinite).

(b) f is continuous from the left at -2 since $\lim_{x\to -2^-} f(x) = f(-2)$. f is continuous from the right at 2 and 4 since $\lim_{x\to 2^+} f(x) = f(2)$ and $\lim_{x\to 4^+} f(x) = f(4)$. It is continuous from neither side at -4 since $f(-4)$ is undefined.

5. The graph of $y = f(x)$ must have a discontinuity at $x = 3$ and must show that $\lim_{x\to 3^-} f(x) = f(3)$.



7. (a)



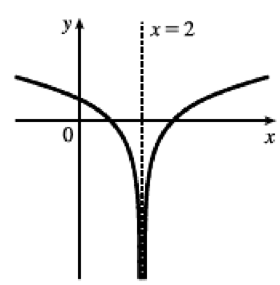
(b) There are discontinuities at times $t = 1$, 2, 3, and 4. A person parking in the lot would want to keep in mind that the charge will jump at the beginning of each hour.

9. Since f and g are continuous functions,

$$\begin{aligned} \lim_{x\to 3} [2f(x) - g(x)] &= 2\lim_{x\to 3} f(x) - \lim_{x\to 3} g(x) && \text{[by Limit Laws 2 and 3]} \\ &= 2f(3) - g(3) && \text{[by continuity of } f \text{ and } g \text{ at } x = 3] \\ &= 2 \cdot 5 - g(3) = 10 - g(3) \end{aligned}$$

Since it is given that $\lim_{x\to 3} [2f(x) - g(x)] = 4$, we have $10 - g(3) = 4$, so $g(3) = 6$.

13. $f(x) = \ln|x - 2|$ is discontinuous at 2 since $f(2) = \ln 0$ is not defined.



18. By Theorem 7, the trigonometric function $\sin x$ and the polynomial function $x + 1$ are continuous on $\mathbb{R}$. By part 5 of Theorem 4, $h(x) = \dfrac{\sin x}{x + 1}$ is continuous on its domain, $\{x \mid x \neq -1\}$.

23. The function $y = \dfrac{1}{1 + e^{1/x}}$ is discontinuous at $x = \mathbf{0}$ because the left- and right-hand limits at $x = \mathbf{0}$ are different.