# 1 Problems

**Exercise 1**. Labor costs 15 an hour for the first hour and 13 an hour for one to five hours, and 16 an hour after that. Write a piecewise function to model this information.

**Exercise 2**. What is the inverse function of $f(x) = 2x + 3$?

**Exercise 3**. What is the inverse function of $f(x) = x^2$ on the domain $[0, \infty)$?

**Exercise 4**. Let $f(x) = \frac{1}{x}$ on the domain $(0, \infty)$. What is its inverse on this domain?

**Exercise 5**. Let $f(x) = \frac{2x+11}{3x-7}$. Find $f^{-1}$. Is it defined everywhere?

# 2 Answer key

**Exercise 1.** $L(x) = \begin{cases} 15x & 0 < x \leq 1 \\ 13(x-1) + 15 & 1 < x \leq 5 \\ 16(x-5) + 67 & x > 5 \end{cases}$

**Exercise 2.** $f^{-1}(x) = \frac{x-3}{2}$.

**Exercise 3.** $f^{-1}(x) = \sqrt{x}$

**Exercise 4.** $f^{-1}(x) = \frac{1}{x}$.

**Exercise 5.** $f^{-1}(x) = \frac{7x+11}{3x-2}$. It is defined everywhere except when $x = \frac{2}{3}$.

# 3 Solutions

**Exercise 1.** For the first hour, the function is linear. After hour one, there is the 15 from the first hour, and the rate of 13 an hour after hour one. Similarly, after hour five, the rate is 16 an hour, with the added constant of 67 from $x = 5$.

**Exercise 2.** Let $y = 2x + 3$ and solve for $x$ in terms of $y$.

**Exercise 3.** Note that $\sqrt{x}$ is not a function on the entire $x$-axis, only on the nonnegative domain $[0, \infty)$.

**Exercise 4.** Again let $y = \frac{1}{x}$ and solve for $x$ in terms of $y$.

**Exercise 5.** The inverse has a zero in its denominator when $x = \frac{2}{3}$. Finding it is again letting $y = \frac{2x+11}{3x-7}$ and solving for $x$.