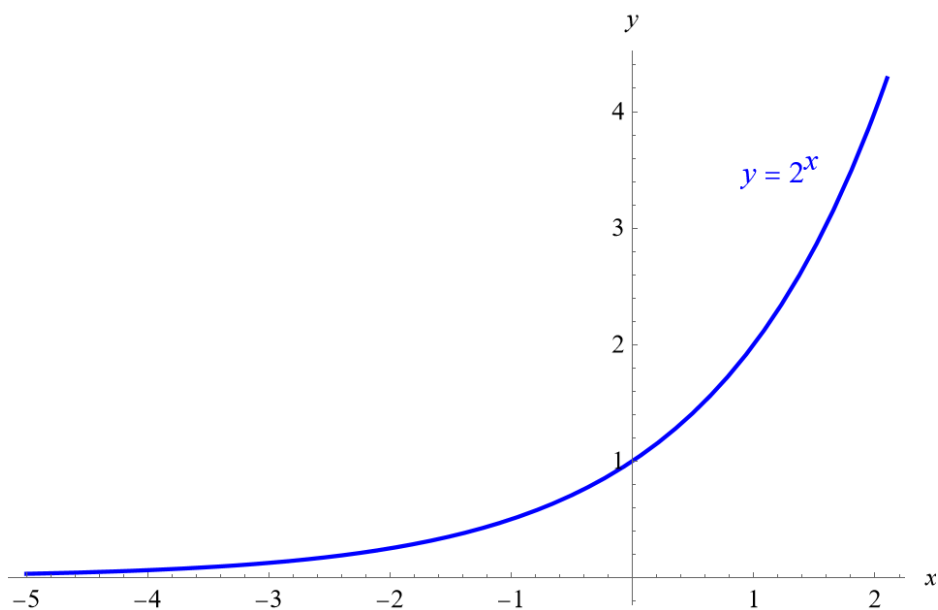## Exercise 243

For the following exercises, sketch the graph of the exponential function. Determine the domain, range, and horizontal asymptote.
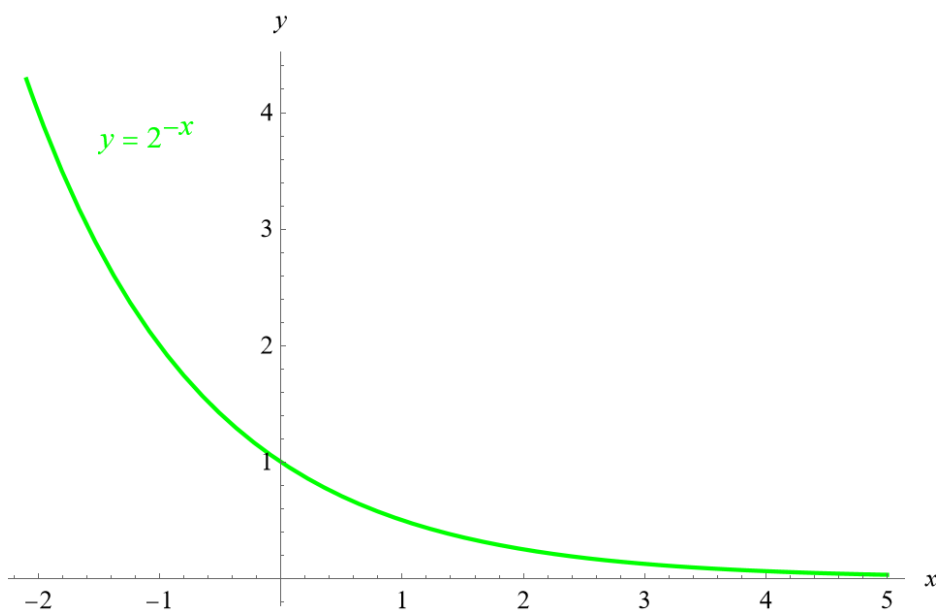
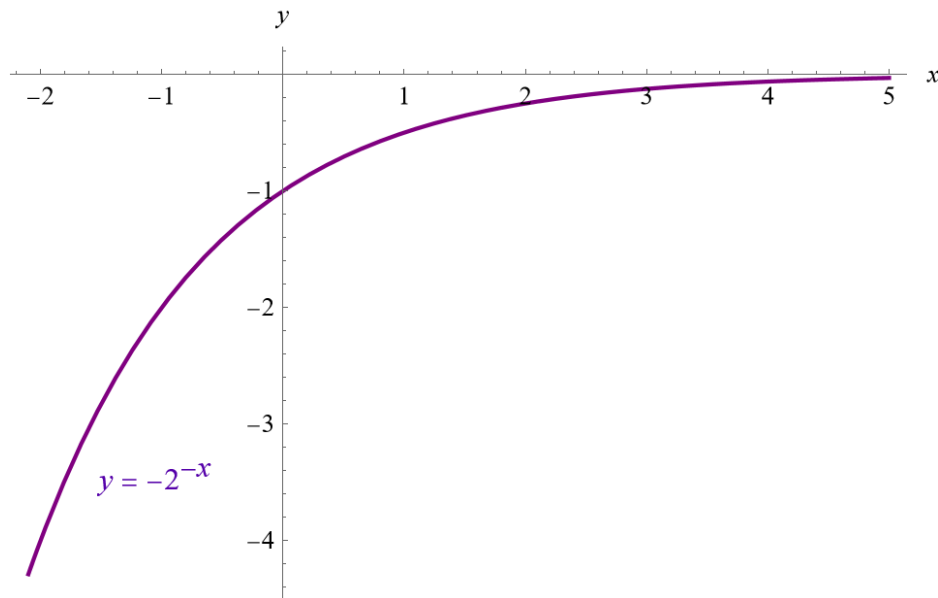$$f(x) = 1 - 2^{-x}$$

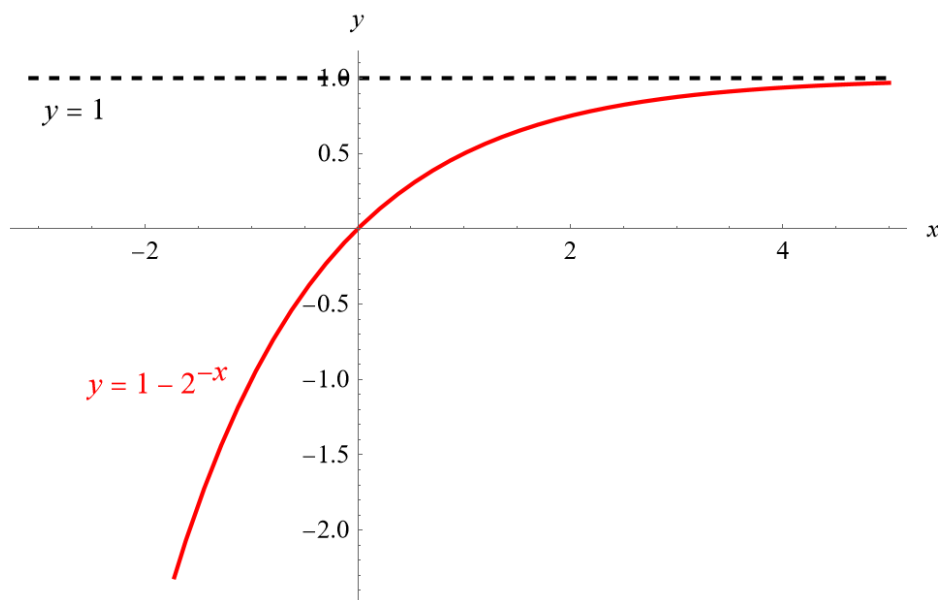### Solution

Start by drawing the parent function $y = 2^x$.

Changing x to $-x$ reflects the graph about the y-axis.

Placing a minus sign in front of 2^{-x} reflects the graph about the x-axis.

$$y = -2^{-x}$$

Adding 1 to this function shifts the entire graph up by 1 unit.

$$y = 1$$

$$y = 1 - 2^{-x}$$

$$\text{Domain}: \qquad \{x \mid -\infty < x < \infty\}$$

$$\text{Range}: \qquad \{y \mid -\infty < y < 1\}$$

$$\text{Horizontal Asymptote}: \qquad y = 1$$