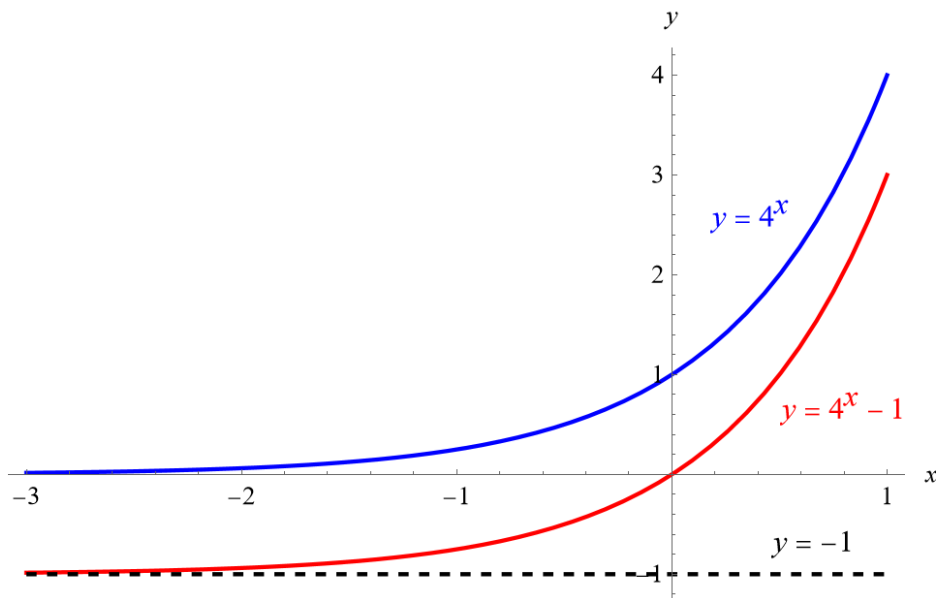## Exercise 242

For the following exercises, sketch the graph of the exponential function. Determine the domain, range, and horizontal asymptote.

$$f(x) = 4^x - 1$$

Solution

Draw the parent function $y = 4^x$ and then draw the transformation $y = 4^x - 1$. The -1 shifts the whole graph down by 1 unit.

$$
\begin{aligned}
\text{Domain}: & \quad \{x \mid -\infty < x < \infty\} \\
\text{Range}: & \quad \{y \mid -1 < y < \infty\} \\
\text{Horizontal Asymptote}: & \quad y = -1
\end{aligned}
$$