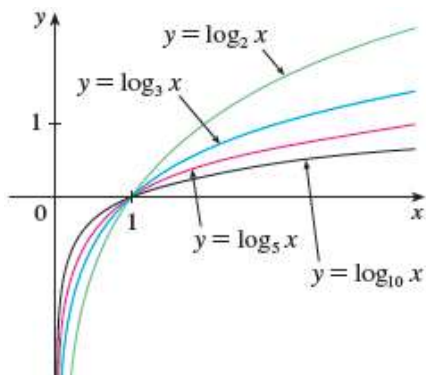


Logarithmic Functions

The **logarithmic functions** $f(x) = \log_b x$, where the base b is a positive constant, are the inverse functions of the exponential functions. They will be studied in [Section 1.5](#). [Figure 21](#) shows the graphs of four logarithmic functions with various bases. In each case the domain is $(0, \infty)$, the range is $(-\infty, \infty)$, and the function increases slowly when $x > 1$.

Figure 21



Example 6

Classify the following functions as one of the types of functions that we have discussed.

- (a) $f(x) = 5^x$
- (b) $g(x) = x^5$
- (c) $h(x) = \frac{1+x}{1-\sqrt{x}}$
- (d) $u(t) = 1 - t + 5t^4$

Solution

- (a) $f(x) = 5^x$ is an exponential function. (The x is the exponent.)
- (b) $g(x) = x^5$ is a power function. (The x is the base.) We could also consider it to be a polynomial of degree 5.
- (c) $h(x) = \frac{1+x}{1-\sqrt{x}}$ is an algebraic function.
- (d) $u(t) = 1 - t + 5t^4$ is a polynomial of degree 4.

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