WIR: Sections 5.5 and 5.6

Section 5.5

(1) Given \( r(x) = \begin{cases} \sqrt{7 - 3x} & x < 0 \\ \frac{x^2 - 2x}{x - 4} & 1 \leq x < 8 \\ (4 - x)^{2/3} & x \geq 8 \end{cases} \), find the following.

(a) the domain of \( r(x) \).
(b) \( r(-1) \)
(c) \( r(1) \)
(d) \( r(10) \)
(e) \( r(2) + r(12) \)

(2) Find the piecewise-defined function for the graph of \( g(x) \) below.

(3) Graph \( f(x) = \begin{cases} 7 - 3x & x < -1 \\ x^2 & -1 < x < 4 \\ 3 & x = -1 \\ -2 & x \geq 4 \end{cases} \)

(4) Write \( h(x) = |3 - 2x| \) as an equivalent piecewise-defined function.

(5) A local internet provider charges customers a flat rate of $60 per month for the first 500 gigabytes (GB) of usage. If usage exceeds 500 GB per month, the company charges $10 for each additional 50 GB used. Write the function, \( B(x) \), which gives the dollar amount of a monthly internet bill when customer uses \( x \) GB of internet per month.
Section 5.6

(6) For each of the exponential functions below, state (a) whether it is a growth or decay function, (b) the domain, (c) the range, (d) the end behaviors (i.e., behavior of the function values as \( x \to \pm \infty \)), (e) the \( x \)-intercept(s), and (f) the \( y \)-intercept(s).

(a) \( g(x) = 2 \left( \frac{3}{2} \right)^x \)

(b) \( h(x) = 2 \left( \frac{3}{2} \right)^{-x} \)

(c) \( t(x) = -2e^x \)

(d) \( z(x) = -2e^{-x} \)

(7) Find the domain of each of the following functions.

(a) \( f(x) = \frac{e^{x+2}}{\sqrt{x+4}} \)

(b) \( g(x) = \frac{e^{\frac{1}{x+1}}}{\sqrt{x+4}} \)

(c) \( h(x) = \frac{2\sqrt{5-x^2}}{3^{x-1}} \)

(8) Solve each of the following equations for \( x \).

(a) \( 25^{-2x} \cdot \frac{2}{125^{x+1}} = 250 \)

(b) \( \frac{49^{3x}}{7^{2x+1}} = 7^3 \cdot 7^4 \)

(9) In 25 years you want to have $150,000 in a bank account. You found a bank that will guarantee 4.8% interest, compounded continuously as long as there are no withdraws after you open the account. How much should you invest now (to the nearest cent) to have the $150,000 in 25 years?