



WIR SOLUTIONS: Sections 5.5 and 5.6

This document contains the answers to the posed problems. Video solutions will be added as they are produced.

Section 5.5

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

(a) the domain of $r(x)$.

Answer: $(-\infty, 0) \cup (1, 4) \cup (4, \infty)$

(b) $r(-1)$

Answer: $\sqrt{10}$

(c) $r(1)$

Answer: $\frac{1}{3}$

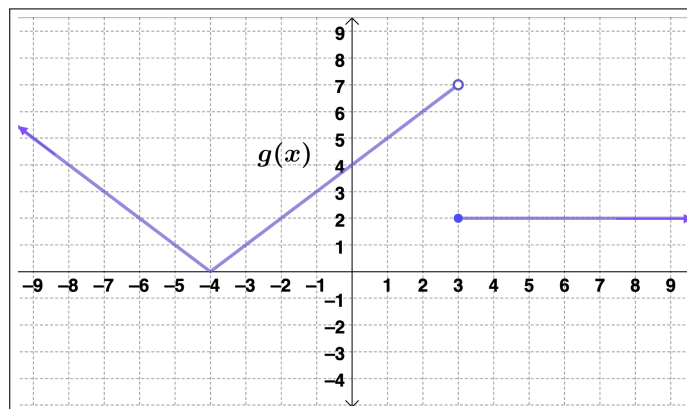
(d) $r(5)$

Answer: 15

(e) $r(2) + r(12)$

Answer: 4

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

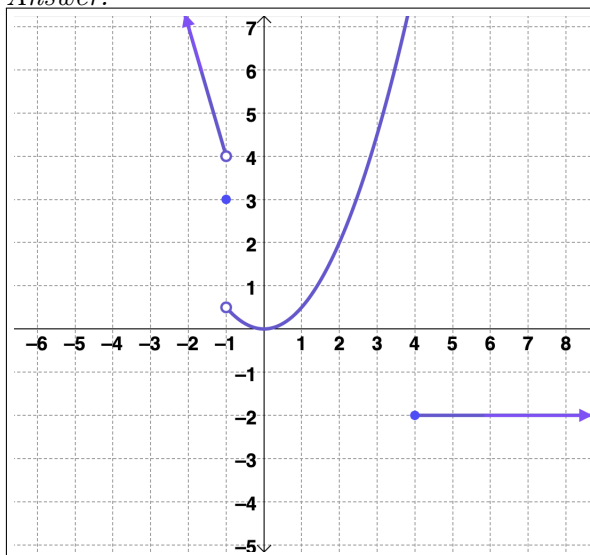


Answer: $g(x) = \begin{cases} |x+4| & x < 3 \\ 2 & x \geq 3 \end{cases}$



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

Answer:



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

Answer: $h(x) = \begin{cases} 3 - 2x & x \leq \frac{3}{2} \\ 2x - 3 & x > \frac{3}{2} \end{cases}$

- (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.

Answer: $B(x) = \begin{cases} 60 & 0 \leq x \leq 500 \\ 0.2x - 40 & x > 500 \end{cases}$



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 $x \rightarrow \pm\infty$), (e) the x -intercept(s), and (f) the y -intercept.

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

Answer: (a) $g(x)$ is an exponential growth function, (b) domain is $(-\infty, \infty)$, (c) range is $(0, \infty)$, (d) As $x \rightarrow \infty, g(x) \rightarrow \infty$. As $x \rightarrow -\infty, g(x) \rightarrow 0$, (e) no x -intercept(s), (f) y -intercept is $(0, 1)$.

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

Answer: (a) $h(x)$ is an exponential decay function, (b) domain is $(-\infty, \infty)$, (c) range is $(0, \infty)$, (d) As $x \rightarrow \infty, h(x) \rightarrow 0$. As $x \rightarrow -\infty, h(x) \rightarrow \infty$, (e) no x -intercept(s), (f) y -intercept is $(0, 1)$.

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

Answer: (a) $t(x)$ is neither an exponential growth or decay function, (b) domain is $(-\infty, \infty)$, (c) range is $(-\infty, 0)$, (d) As $x \rightarrow \infty, t(x) \rightarrow -\infty$. As $x \rightarrow -\infty, t(x) \rightarrow 0$, (e) no x -intercept(s), (f) y -intercept is $(0, -2)$.

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

Answer: (a) $z(x)$ is neither an exponential growth or decay function, (b) domain is $(-\infty, \infty)$, (c) range is $(-\infty, 0)$, (d) As $x \rightarrow \infty, z(x) \rightarrow 0$. As $x \rightarrow -\infty, z(x) \rightarrow -\infty$, (e) no x -intercept(s), (f) y -intercept is $(0, -2)$.

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

(a) $f(x) = \frac{e^{x+2}}{\sqrt[3]{x+4}}$

Answer: $(-\infty, -4) \cup (-4, \infty)$

(b) $g(x) = \frac{e^{\frac{x}{x+2}}}{\sqrt[3]{x+4}}$

Answer: $(-\infty, -4) \cup (-4, -2) \cup (-2, \infty)$

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

Answer: $\left(-\infty, \frac{5}{2}\right]$



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

(a) $25^{-2x} \cdot \frac{2}{125^{x+4}} = 250$

Answer: $x = -\frac{15}{7}$

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

Answer: $x = 2, 4$

(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 withdrawals after you open the account. How much should you invest now (to the nearest cent) to have the \$150,000 in 25 years?

Answer: \$45,179.13