



SECTION 5.5: PIECEWISE-DEFINED FUNCTIONS

Pr 1. Let $f(x) = \begin{cases} 3x - 1 & x < -3 \\ x^2 - 1 & -3 \leq x < 3 \\ 7 & 3 \leq x \leq 5 \\ \frac{1}{x-5} & x > 6 \end{cases}$. Compute the following function values.

(a) $f(-5)$.

(b) $f(-3)$.

(c) $f(0)$.

(d) $f(3)$.

(e) $f(6)$.

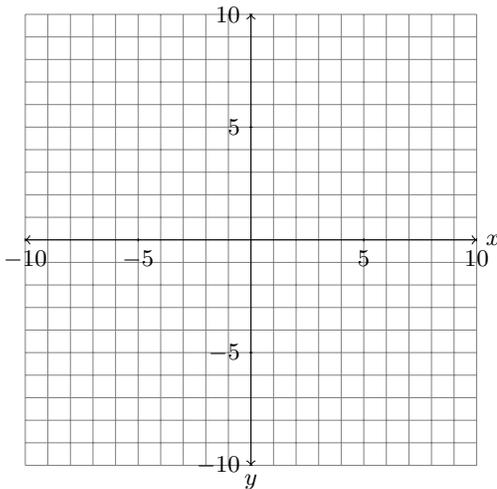
(f) $f(7)$.

Pr 2. State the domain of $g(x)$.

$$g(x) = \begin{cases} x + 1 & x < -3 \\ \frac{1}{x+1} & -2 \leq x < 3 \\ \sqrt{x-2} & x \geq 3 \end{cases}$$

Pr 3. Sketch the graph of $h(x)$ as well as the graph of $k(x) = |x|$.

$$h(x) = \begin{cases} 2x - 3 & x \leq -3 \\ 8 & -1 \leq x < 2 \\ x^2 - 3 & x \geq 2 \end{cases}$$



Pr 4. Rewrite $f(x) = |5 - 3x|$ as a piecewise-defined function.

Pr 5. Suppose that you have a channel on a social media server. The social media company pays you \$.01 for each view for the first 1000 views on a video, and then \$.05 for each additional view, up to the first 5000 views. After that, each additional view is \$.10. Let $R(v)$ be the revenue you make for having v views on one of your videos. Write the corresponding function.

SECTION 5.6: EXPONENTIAL FUNCTIONS

- Exponential Function
- Exponential Growth and Exponential Decay
- Common Base Property of Exponents: For $b \neq 1$, $b^S = b^T$ if and only if $S = T$.
- Finance Applications

Pr 1. Rewrite each exponential expression as a single equivalent expression in the stated base.

(a) $125 \cdot 5^{x+3}$, base 5.

(b) $\left(\frac{1}{2}\right)^x \frac{8}{4^x}$, base 2.

Pr 2. Determine if each function is an exponential function. If the function is an exponential function, determine whether the function represents exponential growth or decay.

(a) 7^{-x}

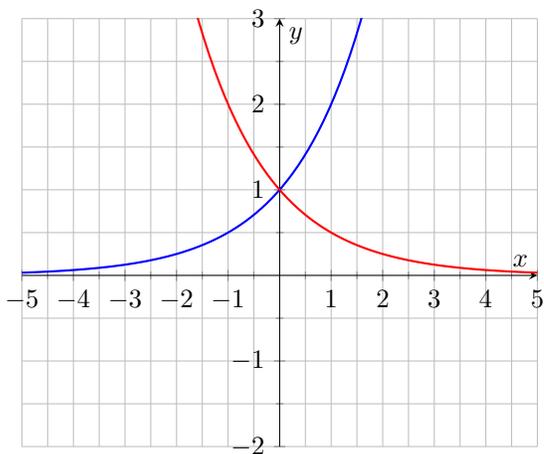
(b) $-3x^{17}$

(c) $\frac{3}{4}2^{x/2+4}$

Pr 3. State the domain of each function, and match each function with the graph of the parent function.

(a) $f(x) = \left(\frac{5}{3}\right)^{x+2}$

(b) $g(x) = 5^{4-x}$



Pr 4. State the domain of each function. Write your answer using interval notation.

(a) $f(x) = 5^{\frac{2x}{x-4}}$

(b) $g(x) = e^{\sqrt{1-4x}}$

(c) $h(a) = \frac{\sqrt[3]{2a-5}}{3^{a+2}}$

Pr 5. Algebraically solve each equation for x .

(a) $3^{5x+1} = 3^{2x-3}$.

(b) $7^{x^2} 7^{2x+1} = 1$.

(c) $\left(\frac{1}{4}\right)^{2x} = 8^{x-5}$.

(d) $\left(\frac{1}{25}\right)^{3x} \cdot 5^x - 1 = 0$

Pr 6. If you invest \$2000 in an account that earns interest at a rate of 3.16% per year, compounded monthly, how much will be in the account after 10 years? If the annual interest is compounded continuously instead of monthly, how much more will be in the account after 10 years compared to your previous answer?

Pr 7. If a company opens in 2018, and the company's revenue grows at an annual rate of 125% per year, the revenue function would be $R(t) = R_0\left(\frac{5}{4}\right)^t$, where R_0 represents the initial revenue earned in 2018, and t represents the number of years since 2018. How much money did the company bring in, in revenue, in 2020, if the company's revenue is \$850,000 in 2023?

SECTION 5.7: COMBINING AND TRANSFORMING FUNCTIONS

Pr 1. Let $g(x) = -2|x - 5| + 7$. Identify the parent function, $f(x)$, and describe the series of transformations that need to be performed to transform $f(x)$ into $g(x)$.

Pr 2. Let $p(x) = \sqrt{x}$. Write the function that results from performing the following transformations on $p(x)$:

- (i) a horizontal shift left 3 units,
- (ii) a vertical compression by a factor of 2,
- (iii) and a vertical shift up 4 units.

Pr 3. Let $f(x) = x^2$. Draw the graph of $g(x)$ obtained from $f(x)$ by the following series of transformations:

- (i) a horizontal shift right 2 units,
- (ii) reflection across the x -axis,
- (iii) and a vertical shift down 5 units.

