

PRECALCULUS LEARNING GOALS

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ABSTRACT. List of learning goals for the book Precalculus - OpenStax. Each learning goal is accompanied by selected practice exercises from the book.

Important Note:

- The page numbers and the section numbers here correspond to the **downloaded pdf version** of the textbook.
- For extra credit: Only turn in the exercises labeled **Assigned Written Exercises**.
- Do NOT turn in the exercises labeled **similar odd-numbered exercises**, these are for practice only, and the answers are provided online.
- Do read the suggested examples. They will help you understand the material and solve the exercises.
- At some point in this document, **Assigned Written Exercises** is abbreviated as **AWE**, **similar odd-numbered exercises** is abbreviated as **SOE**, and **Reading** is abbreviated as **R**.
- The answers to the odd-numbered exercises can be found by going to the website <https://openstax.org/details/precalculus>, click on **View Online** and go to the corresponding sections and exercises.

CHAPTER 1

1.2 - Domain and Range.

- (1) Find the domain of a function defined by an equation.
Assigned Written Exercises (AWE) (can be turned in for extra credit): 6, 12, 16, 18, 22 and 24.
Reading (R) (examples with full solutions in the book): Example 2, 3, and 4 Pg 24 and 25.
Similar Odd-Numbered Exercises (SOE) (Answer available online, for practice only, do NOT turn in): 7, 13, 17, 21, 25.
- (2) Find the domain and range of a function from the graph.
Assigned Written Exercises (AWE): 30, 34, 36.
Reading (R): Example 6 and 7 Pg 27 and 28.
Similar Odd-Numbered Exercises (SOE): 31, 35, 37.
- (3) Sketch the graph of a piecewise function and find the domain.
Assigned Written Exercises (AWE): 38, 44, 50.
Reading (R): Example 11, 12, and 13 Pg 32 and 33.
Similar Odd-Numbered Exercises (SOE): 39, 45, 51.

1.3 - Rates of Change and Behavior of Graphs.

- (1) Find the average rate of change of a function.
Assigned Written Exercises (AWE): 10, 12, 14, 16, 26, 34, 42, 46.
Reading (R): Example 1, 2, 3, 4, 5, 6.
Similar Odd-Numbered Exercises (SOE): 9, 11, 13, 15, 17, 27, 33, 45.
- (2) Determine the intervals on which a function is increasing/decreasing and determine local and/or absolute minima and/or maxima of a function given its graph.
Assigned Written Exercises (AWE): 20, 24, 40.
Reading (R): Example 7, 8, 9, and 10.

Similar Odd-Numbered Exercises (SOE): 21, 23, 39.

CHAPTER 3

3.2 - Quadratic Functions.

- (1) Use the standard form of a quadratic equation to find the vertex, the maximum/minimum value, the axis of symmetry, and the domain and range of the function. Solve quadratic equations.
AWE: 10, 20, 24, 44, 76.
R: Example 3, 4, 7, 8, and 9.
SOE: 9, 19, 25, 43, 77.
- (2) Sketch the graph of a quadratic function. Find the general form of the equation of a quadratic function given its graph or given the vertex and a point.
AWE: 48, 56, 60, 64.
R: Example 2.
SOE: 49, 57, 61, 63.
- (3) Solve application problems that involve quadratic functions.
AWE: 86, 90, 92.
R: Example 5, 6, and 10.
SOE: 87, 91.

3.7 - Rational Functions.

- (1) Find the domain, vertical asymptotes, horizontal asymptotes, x and y-intercepts, slant-asymptotes of a given rational function. Use That information to graph rational functions.
AWE: 14, 16, 18, 22, 34, 42, 46.
R: Example 4, 5, 7, 8, 9, 10, and 11.
SOE: 15, 17, 19, 23, 33, 41, 47.
- (2) Find an equation for a rational function with given its graph or certain characteristics.
AWE: 52, 54, 64.
R: Example 12.
SOE: 51, 55, 63.
- (3) Identify removable discontinuities (if any) of a rational function.
AWE: 76, 78
R: Example 6.
SOE: 77, 79.
- (4) Solve application problems that involve rational functions.
AWE: 82, 84
R: Example 3.
SOE: 83, 85.

CHAPTER 4

4.1 - Exponential Functions.

- (1) Identify exponential functions, distinguish between exponential growth and exponential decay, find the formula for an exponential function which satisfies certain conditions, evaluate exponential functions.
AWE: 6, 8, 10, 12, 14, 16, 22, 44, 50.
R: Example 1, 2, 4, 5, and 6.
SOE: 5, 7, 9, 11, 15, 17, 21, 45, 49.
- (2) Use the compound interest formula to solve problems. Solve application problems that involve exponential functions.
AWE: 30, 34, 62, 66.
R: Example 4, 8, 9, 11, and 12.
SOE: 29, 31, 35, 61, 67.

4.2 - Graphs of Exponential Functions.

- (1) Graph an exponential function using the translations of a parent function.

AWE: 12, 26, 28, 30, 32, 36, 40, 42.

R: Example 2, 4, 5, and 6.

SOE: 9, 27, 29, 33, 37, 39, 41.

4.3 - Logarithmic Functions.

- (1) Convert from logarithmic to exponential form and vice versa.

AWE: 10, 14, 22, 30.

R: Example 1 and 2.

SOE: 11, 15, 23, 35.

- (2) Evaluate logarithms with common base, natural base and other bases without using a calculator.
Solve application problems.

AWE: 36, 40, 44, 46, 52, 64, 66.

R:

SOE: 37, 41, 45, 53, 65.

4.4 - Graphs of Logarithmic Functions.

- (1) Determine the domain, vertical asymptote, end behavior, x- and y-intercepts of a logarithmic function.

AWE: 10, 14, 20, 22.

R: Example 1 and 2.

SOE: 9, 15, 19, 25.

- (2) Graph a logarithmic function using translations of a parent function.

AWE: 32, 38, 40, 46.

R: Example 4, 5, 6, 7, and 8.

SOE: 31, 39, 41, 45.

- (3) Find the equation of a logarithmic function from a graph.

AWE: 48, 50.

R: Example 10 and 11.

SOE: 47, 49.

4.5 - Logarithmic Properties.

- (1) Apply the logarithmic properties to expand or condense expressions.

AWE: 6, 12, 18, 24, 30, 38.

R: Example 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11.

SOE: 7, 11, 19, 23, 31, 39.

- (2) Apply the Change of Base formula to solve problems.

AWE: 26, 28, 42.

R: Example 13 and 14.

SOE: 25, 29, 41.

4.6 - Exponential and Logarithmic Equations.

- (1) Solve exponential and logarithmic equations.

AWE: 10, 24, 26, 34, 42, 48.

R: Example 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 12.

SOE: 7, 25, 27, 35, 43, 47.

- (2) Solve applications problems that involve logarithmic or exponential equations.

AWE: 66, 80.

R: 13.

SOE: 67, 81.

4.7 - Exponential and Logarithmic Models.

- (1) Models exponential growth and decay.
AWE: 24, 28, 32, 36.
R: Example 1, 2, 3, and 4.
SOE: 23, 29, 33, 37.
- (2) Use Newton's Law of Cooling to solve problems.
AWE: 40, 44.
R: Example 5.
SOE: 41, 43.
- (3) Use the logistic growth models to solve problems.
AWE: 50, 52.
R: Example 6.
SOE: 51.

CHAPTER 6

6.1 - Graphs of the Sine and Cosine Functions.

- (1) Graph analyze graphs of sine and cosine functions and their variations (sinusoidal functions). Determine the amplitude, the period, the phase shift of a sinusoidal function and solve related problems.
AWE: 14, 16, 20, 22, 34, 36, 40, 48.
R: Example 1, 2, 3, 4, 5, 8, 9, 10, 13.
SOE: 13, 17, 19, 21, 35, 39, 41.
- (2) Find the equation for a sinusoidal function from a graph.
AWE: 24, 26, 28, 30.
R: Example 6, 7,
SOE: 23, 25, 27, 29.

6.2 - Graphs of the other trigonometric functions.

- (1) Graph and analyze graphs of the tangent, cotangent, secant and cosecant functions. Determine the stretching factor, period and asymptotes of these functions.
AWE: 20, 26, 32, 36.
R: Example 1, 2, 4, 5, 6, 7, 8, 9.
SOE: 19, 31, 33, 35.
- (2) Find an equation for a trigonometric function from its graph.
AWE: 40, 42, 44.
R: Example 3.
SOE: 41, 43, 45.

CHAPTER 7

7.5 - Solving Trigonometric Equations.

- (1) Solve linear trigonometric equations in sine and cosine.
AWE: 4, 14.
R: Example 1, 2, 3.
SOE: 5, 13.
- (2) Solve equations that involve a single trigonometric function.
AWE: 10, 12.
R: Example 4, 5, 6, 7.
SOE: 9, 11.
- (3) Solve trigonometric equations in quadratic form.
AWE: 42, 44, 48.
R: Example 10, 11, 12, 13.
SOE: 41, 45, 49.

- (4) Solve trigonometric equations using identities.
AWE: 26, 32, 34, 36, 38, 50, 62, 86, 90, 92.
R: Example 14, 15, 16.
SOE: 27, 33, 37, 39, 53, 63, 85, 89, 91.
- (5) Solve trigonometric equations with multiple angles.
AWE: 18, 20, 22.
R: Example 17.
SOE: 17, 19, 21.
- (6) Solve right triangle problems and application problems.
AWE: 96, 100
R: Example 18, 19.
SOE: 97, 99.