# 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.