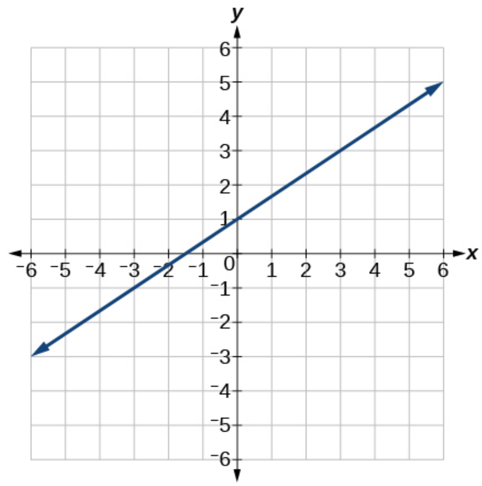
Exam 1 Study Guide

Overview: Exam 1 will be based on the following sections of the textbok: 1.1-1.5, 1.7, 2.1-2.3, & 3.2-3.4. Anything covered in these sections is fair game for the exam.

Practice Problems: The following problems are a good indicator of what you may encounter on the exam. All of the problems are from the textbook. The answer to each problem can be found by clicking on the problem numbers on the left. This is not a practice exam - you should expect far fewer problems during the timed exam.

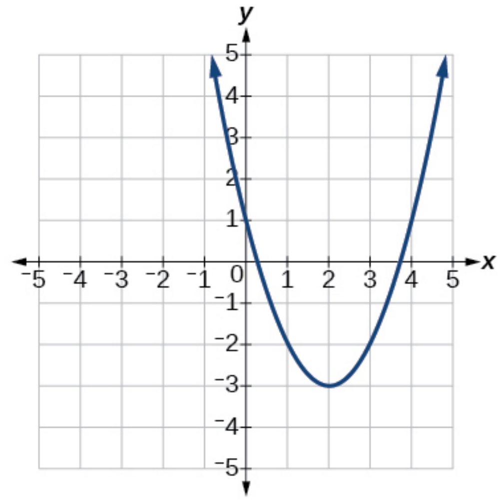
- (1.2.17) Find the domain using interval notation: $f(x) = \frac{x-3}{x^2+9x-22}$.
- (1.2.11) Find the domain using interval notation: $f(x) = \sqrt{x^2+4}$.
- (1.2.41) Sketch the graph of $f(x) = \begin{cases} 3, & \text{if } x < 0 \\ \sqrt{x}, & \text{if } x \geq 0. \end{cases}$ What is the range? Is the function one-to-one?
- (1.3.31) Find the average rate of change of $g(x) = 3x^3 - 1$ on $[-3, 3]$.
- (1.4.81) Let $f(x) = x^3 + 1$ and $g(x) = \sqrt[3]{x-1}$. Find $(f \circ g)(2)$ and $(g \circ f)(2)$.
- (1.4.83) Let $f(x) = x^3 + 1$ and $g(x) = \sqrt[3]{x-1}$. What is the domain of $(f \circ g)(x)$?
- (1.5.65) A function $g(x)$ is obtained from $f(x) = \frac{1}{x^2}$ by the following transformations: a vertical compression by a factor of $\frac{1}{3}$ and shift to the left by 2 units and a shift down by 3 units. Write down the formula for $g(x)$.
- (1.5.71) The function $h(x) = -2|x-4| + 3$ is obtained from a a "toolkit" function $f(x)$ by transformations. Identify the toolkit function $f(x)$ and give a verbal description of how the graph of $h(x)$ is obtained from the graph of $f(x)$. Then graph $h(x)$.
- (1.7.11) Verify that the function $f(x) = \frac{x}{x+2}$ is one-to-one. Then find $f^{-1}(x)$.
- (1.7.17) Determine whether or not the functions $f(x) = \sqrt[3]{x-1}$ and $g(x) = x^3 + 1$ are inverse funtions.
- (2.1.5) A boat is 100 miles away from the marina, sailing directly toward it at 10 miles per hour. Write an equation for the distance of the boat from the marina after t hours.
- (2.1.31) Suppose that $f(x)$ is a linear function satisfying $f(-1) = 4$ and $f(5) = 1$. Find the equation of $f(x)$.

- (2.1.41) Find the equation of the line in the following graph:

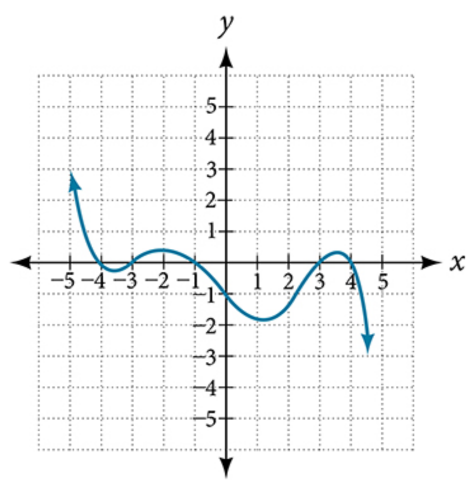


- (2.2.19) Line 1 passes through $(-8, 55)$ and $(10, 89)$ and line 2 passes through $(9, -44)$ and $(4, -14)$. Are the lines parallel, perpendicular, or neither?
- (2.2.25) Find the equation of a line parallel to $g(x) = 3x - 1$ and passing theough $(4, 9)$.
- (2.2.27) Find an equation of the line perpendicular to $p(t) = 3t + 4$ and passing through the point $(3, 1)$.
- (2.2.29) Determine whether the lines $f(x) = 2x + 5$ and $g(x) = -3x - 5$ are parallel. If they are not parallel, find the point of intersection.
- (2.3.49) In 1991, the moose population in a park was measured to be 4,360. By 1999, the population was measured again to be 5,880. Assume the population continues to change linearly.
  - (a) Find a formula for the moose population, P since 1990.
  - (b) What does your model predict the moose population to be in 2003?
- (2.3.53) You are choosing between two different prepaid cell phone plans. The first plan charges a rate of 26 cents per minute. The second plan charges a monthly fee of \$19.95 plus 11 cents per minute. How many minutes would you have to use in a month in order for the second plan to be preferable?
- (3.2.13) Write the quadratic $f(x) = 3x^2 - 5x - 1$ in standard form. Determine the line of symmetry and the vertex. Determine the x and y intercepts. Is the vertex a maximum or a minimum? Find the range of $f(x)$. Graph $f(x)$.

- (3.2.59) Find the equation of the quadratic function graphed below:

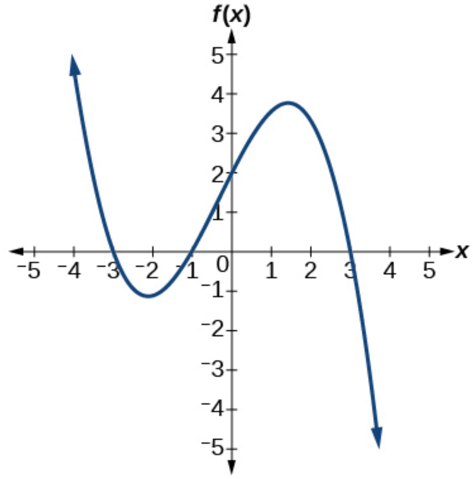


- (3.3.15) Identify the leading term, the leading coefficient, and the degree of the polynomial $f(x) = x(4 - x^2)(2x + 1)$.
- (3.3.23) Determine the end behaviour of $f(x) = x^2(2x^3 - x + 1)$.
- (3.3.33) Identify the smallest possible degree of the following function:



- (3.4.17) Use factoring to find the zeros (x intercepts) of the polynomial $f(x) = 2x^3 - x^2 - 8x + 4$. Identify the multiplicity of each zero.
- (3.4.43) Graph (by hand) the polynomial $f(x) = (x + 4)(x - 1)^2$. Identify the end behaviour, the zeros and their multiplicities, an the y intercept. For a more precise graph, plot $f(-2)$ as well. What is the maximum number of turning points?
- (3.4.45) Graph (by hand) the polynomial $f(x) = (x - 3)^3(x - 2)^2$. Identify the end behaviour, the zeros and their multiplicities, an the y intercept. For a more precise graph, plot $f(5/2)$ as well. What is the maximum number of turning points?

- (3.4.49)



- (3.4.53) Use the graph to identify the polynomials zeros and their multiplicities. Write down an equation of least degree for the polynomial.