1. Find the domain of the following functions, and write your answer in interval notation.

   (a) $f(x) = \dfrac{1}{x^2 + 5x + 6}$.

   (b) $g(x) = \sqrt{(-2x + 7)^5}$.

   (c) $h(x) = \sqrt[3]{3x + 5}$.

2. Suppose the price-demand function for a bait shop selling nightcrawlers is given by $p(x) = 3 - 0.06x$, where x is how many dozen nightcrawlers are sold in a given week and $p(x)$ is the price in dollars for one dozen of nightcrawlers.

   (a) Evaluate $p(12)$ and interpret.

   (b) If the price of nightcrawlers was \$1.98 during a certain week, then what was the demand for nightcrawlers that week?

3. Some company has a price-demand function of $p(x) = 160 - x$, where x denotes the number of units and $p(x)$ is the price in dollars. In addition, the company pays a fixed cost of \$200, plus it pays \$50 to purchase each unit to sell.

   (a) Determine the revenue and profit functions, $R(x)$ and $P(x)$ respectively, for that company.

   (b) How many units must the company sell in order to maximize profit, and what is the maximum profit?

   (c) How many units does the company need to sell in order to break even?

4. Consider the rational function $f(x) = \dfrac{-4x^2 + 8x}{7x^2 - 28}$.

   (a) Identify any horizontal asymptotes.

   (b) Identify any vertical asymptotes and holes in the graph of $y = f(x)$.

5. Let $f(x) = 6x^2 - 11x + 3$. Find the x and y intercepts of the graph of $y = f(x)$.

6. Suppose a rock is thrown into the air from the edge of a cliff, and its height above the ground is given by $s(t) = -16t^2 + 48t + 160$. Here, t is the number of seconds after the rock is thrown and s is measured in feet.

   (a) Determine the average rate of change in the rock's height from $t = 2$ to $t = 4$ seconds, and interpret the result.

   (b) At what time does the rock reach its maximum height, and how high does it go?

   (c) When does the rock hit the ground?

7. Consider the points $P = (2, -1)$ and $Q = (4, 2)$. Determine the equation of the line that contains the points P and Q, and write your answer in slope-intercept form.

8. Suppose Andrew invests 3000 into an account with an annual rate of 4%. How much money will be in the account after 9 years if the interest is compounded

   (a) Monthly?

   (b) Continuously?

9. Perform the indicated operations.

   (a) Use the properties of logarithms to write $\ln \dfrac{7\sqrt[4]{27}}{12}$ as a sum and/or difference of logarithms.

   (b) Rewrite the expression $3^6 = 729$ as a logarithmic expression $\log_b x = y$.

10. Solve $2 \cdot 7^x = 137$ algebraically for x and round your answer to two decimal places.

11. Suppose Jennifer invests money into an account with an annual rate of 4.5% compounded continuously. How many years does it take for the amount of money in her account to double?

12. Algebraically compute the following limits (do not use tables).

(a) $\lim_{x\to\infty} \dfrac{3x^5 + 6x^4 - 7x^2 + 11}{4x^6 - 5x^2 + 1}$.

(b) $\lim_{x\to 7} \dfrac{-3(x-7)}{5(x^2 - 3x - 28)}$.

(c) $\lim_{x\to -\infty} \dfrac{28x^7 - x^6 + 3x^5 - 7x^4 + 2x^3 + 5x - 1}{21x^7 + 3x^6 - 5x^5 + 11x^4 - 22x^3 - x^2 + 13}$.

13. Solve for x: $7^{3x+2} = 5^{x-4}$. Round your answer to 3 decimal places.

14. Let $f(x) = \dfrac{3}{(x-2)^2}$. Clearly, $x = 2$ is the vertical asymptote.

(a) Determine $\lim_{x\to 2^-} f(x)$.

(b) Determine $\lim_{x\to 2^+} f(x)$.

(c) Does $\lim_{x\to 2} f(x)$ exist? Explain your answer.