

## CHAPTER 1 PRACTICE QUESTIONS

**Directions:** Complete the following open-ended problems as specified by each question stem. For extra practice after answering each question, try using an alternative method to solve the problem or check your work.

- Find all of the zeros of the polynomial function  $f(x) = x^4 - x^2 - 20$ .
- Find all the zeros of  $f(x) = x^4 - 3x^3 + 6x^2 + 2x - 60$  given that  $1 + 3i$  is a zero of  $f$ .
- Find the solutions of the quadratic  $3x^2 - 2x + 5 = 0$ .
- Write  $6i(5 - 2i)$  in the form  $a + bi$ .
- Expand and simplify  $(2 + 3i)^2 + (2 - 3i)^2$ .
- Expand the binomial  $(2t - s)^5$  using Pascal's Triangle to determine the coefficients.
- Given  $f(x) = x^3 - x^2 - 2x$ , find a new function,  $g$ , which is created by shifting  $f(x)$  4 units to the right.
- A group of students are painting a poster to promote the math team. They paint a grid on a piece of poster board, when a centipede starts walking on the board. They step away and watch as the centipede trails the fresh paint as it walks, forming a path that can be described by the cubic function  $f(x) = x^3 + 6x^2 - x - 30$ . At what points will the centipede cross the horizontal axis and bring with it more paint to continue its odd drawing?
- A few friends have recently started a technology company and want to have the best possible launch for their new smartphone. The demand for the phone follows a curve as described by the equation  $d = \frac{-1}{20}c^2 + 125$ , where  $c$  is the price at which each phone is being sold and  $d$  is the number of phones that would be sold per month at that price. Due to cost of labor and technology, however, it costs \$15 to manufacture each phone. Write and graph a polynomial function representing the company's monthly profit,  $p$ , in terms of  $c$ . At what price point would the company start to make money by selling the phones? At what price point after that would the company begin to lose money?