Practice 2.3.2: The Remainder Theorem

For problems 1 and 2, use synthetic division to find each quotient.

1. $(x^3 - 7x^2 + 36) \div (x - 3)$

2. $(2x^4 - 6x^2 + 8x + 2) \div (x + 2)$

For problems 3 and 4, use synthetic substitution to evaluate each function.

3. $p(x) = 3x^2 + 6x + 10$ for $x = -4$

4. $p(x) = x^5 + 4x^3 + 2x - 16$ for $x = 2$

For problems 5 and 6, find the value of k.

5. $(x^2 + kx + 10) \div (x - 1)$ has a remainder of 4.

6. $(x^2 + 5x + k) \div (x + 6)$ has a remainder of 9.

For problems 7–10, use the Remainder Theorem to solve each problem.

7. The area in square feet of a rectangular garden can be expressed as the product of the garden's length and width, or $A(x) = 3x^2 + 13x + 14$. If the width of the garden is $(x + 2)$ feet, what is the length of the garden?

8. The area in square meters of a rectangular patio can be expressed as the product of the patio's length and width, or $A(x) = 7x^2 - 34x - 24$. If the length of the patio is $(x - 4)$ meters, what is the width of the patio?

9. A generator produces voltage using levels of current modeled by $I(t) = t + 4$, where $t > 0$ represents the time in seconds. The power of the generator can be modeled by $P(t) = 0.5t^3 + 8t^2 + 24t$. If voltage is calculated by dividing $P(t)$ by $I(t)$, what expression represents the voltage of the generator?

10. A second generator produces voltage using levels of current modeled by $I(t) = t + 4$, where $t > 0$ represents the time in seconds. The power of the generator can be modeled by $P(t) = 0.2t^3 + 8.8t^2 + 32t$. What expression represents the voltage of this generator?