7-1 Lesson Master

Questions on SPUR Objectives

SKILLS Objective A
In 1 and 2, consider the polynomial function \( p(x) = -2x^3 + 4x^2 - 9x + 3 \).

1. Find the zero of \( p \) nearest to the nearest tenth. 
   \( x = 0.6, x = 1, x = 2.4 \)

2. Find the nearest thousandths of the relative extrema of \( p \). 
   \( (0.806, -0.104), (1.980, 0.087) \)

PROPERTIES Objective F
1. For the polynomial function \( p(x) = 7x + 3x^4 - 4 - x^6 \), identify:
   a. The degree of the polynomial: \( 6 \)
   b. The coefficient of \( x^4 \): \( 3 \)
   c. The leading coefficient: \( -1 \)
   d. The constant term: \( -4 \)

USES Objective I
4. Express the volume \( V \) of a box with side \( s \) as shown at the right as a polynomial function of \( s \).
   \( V = 5sx^2 + 60x + 320 \)

5. Find the maximum volume of the box.
   \( 500 \)

6. Sally saved some of her summer salary each year to help pay for college. She had the same savings factor \( 1 \) each year. A polynomial for her savings is \( S(t) = 500t + 790t^2 + 1900t^3 + 150t^4 \).
   a. What amount did Sally save her second summer?
      \( \$780 \)
   b. Which summer did Sally spend all her salary?
       \( \$5885.80 \)
   c. Evaluate \( S(10) \) to approximate what it means.

The sum of Sally’s summer savings if the interest rate is 2.25%.

REPRESENTATIONS Objective G
1. Consider the graph of \( f(x) = \frac{1}{3}x^2 + 4x - 8 \). Use the letter labels.
   a. In what interval(s) \( f(x) < 0 \)?
      \( x < -4 \) or \( x > 2 \)
   b. In what interval(s) \( f(x) > 0 \)?
      \( -4 < x < 2 \)

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7-3 Lesson Master

Questions on SPUR Objectives

VOCABULARY
1. Give the definition of a polynomial.
   A polynomial in \( x \) is an expression of the form \( a_nx^n + a_{n-1}x^{n-1} + \cdots + a_1x + a_0 \), where \( n \) is a non-negative integer and \( a_n \neq 0 \).

2. State the Remainder Theorem.
   If a polynomial \( p(x) \) is divided by \( x - c \), then the remainder is \( p(c) \).

SKILLS Objective C
3. Is the polynomial \( f(x) = 2x^3 + 3x^2 - x - 4 \) divided by \( x - 2 \)? What is the remainder?
   \( f(2) = 12 \)

4. Suppose \( g(x) = 4x^3 + 8x^2 + 2x - 8 \), and \( g(2) = 2 \). Find possible polynomials \( f(x) \) and \( g(x) \).
   \( f(x) = x^3 + 1 \)
   \( g(x) = 4x^2 + 8x + 2 \)

5. In 6-8, determine the quotient and remainder when the first polynomial is divided by the second.
   a. \( 2x^2 + 6x^2 + 18x^2 + 90x^2 + 2250 \), \( 11.180 \)
   b. \( 2x^3 - 4x^2 + 10x^2 + 4x \)
   c. \( 2x^4 - 5x^3 + 11x^2 - 2x^2 + 12 - 3x^3 - 2x^2 \)
   d. \( 2a^3 + 5a^2 - 23; 12a - 4 \)

6. In 9-12, use the Remainder Theorem to find the remainder when the first polynomial is divided by the second.
   a. \( f(x) = x^4 - x^3 + x^2 - x + 1 \), \( x - 1 \)
   b. \( f(x) = x^4 + x^3 + x^2 + x + 1 \), \( x - 1 \)
   c. \( f(x) = x^4 - x^3 + x^2 - x + 1 \), \( x - 1 \)
   d. \( f(x) = x^4 + x^3 + x^2 + x + 1 \), \( x - 1 \)

6a. \( p(-1) = -6 \)
   b. \( p(1) = 2 \)
   c. \( p(3) = 22 \)
   d. \( p(2) = 21 \)

7-4 Lesson Master

Questions on SPUR Objectives

SKILLS Objective D
1. Find a 3rd degree polynomial \( p(x) \) with integer coefficients whose zeros are \( -2, \frac{1}{3}, 3 \).
   Answers vary. Sample: \( p(x) = 3x^3 - 13x^2 - 43x + 30 \)

2. If \( 2X^3 - 11x^2 + 2X + 14 \) is a factor of \( (x - 7) \), what must be true about \( x \)?
   \( x = 7 \)

3. Factor \( e^4 - 4e^2 + 8 \)
   \( e^2 - 2e + 2 \)

4. Use the Factor Theorem to prove that \( (x - 3) \) is a factor of \( f(2) \).
   \( f(2) = 0 \)

5. Let \( f(x) \) be a polynomial with a factor of \( x - 7 \) and \( x + 3 \) a factor of \( f(x) \). Use the Factor Theorem to prove that \( (x - 3) \) is a factor of \( f(2) \).
   \( f(2) = 0 \)

6. Find the quotient and remainder when the first polynomial is divided by the second.
   a. \( 3x^4 - 2x^3 + x^2 - 1 \), \( 2x^2 - 1 \)
   b. \( 4x^3 - 3x^2 + 2x - 1 \), \( x^2 + 1 \)
   c. \( 5x^4 - 2x^3 + 3x^2 - 1 \), \( x^2 + 1 \)
   d. \( 6x^4 - 3x^3 + 2x^2 - 1 \), \( x^2 + 1 \)

REPRESENTATIONS Objective J
1. Write an equation for \( p(x) = x^4 - 11x^3 + 21x^2 + 59x^2 - 70x \).
   \( p(x) = x^4 - 11x^3 + 21x^2 + 59x - 70 \)

Answers vary. Sample: \( p(x) = x^4 - 11x^3 + 21x^2 + 59x^2 - 70x \)

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