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Chapter 2 Review

BLM 2–9
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2.1 The Remainder Theorem

1. i) Use the remainder theorem to determine the remainder for each division.

ii) Perform each division. Express the result in quotient form. Identify all restrictions on the variable.

a) $x^3 + 4x^2 - 3$ divided by $x - 2$

b) $3x^3 - 5x^2 + 2x - 6$ divided by $x - 5$

c) $2x^4 - 3x^3 - 4x^2 + 5x - 15$ divided by $2x + 1$

2. a) Determine the value of k such that when $f(x) = 3x^5 - 4x^3 + kx^2 - 1$ is divided by $x + 2$, the remainder is -5.

b) Use Technology Verify your answer in part a) using technology.

3. For what value of m will the polynomial $P(x) = 2x^3 + mx^2 - 4x + 1$ have the same remainder when it is divided by $x + 2$ and by $x - 3$?

2.2 The Factor Theorem

4. List the values that could be zeros of each polynomial. Then, factor the polynomial.

a) $x^3 + x^2 - 10x + 8$

b) $2x^3 + 7x^2 + 7x + 2$

c) $3x^4 + x^3 - 14x^2 - 4x + 8$

5. Factor each polynomial.

a) $x^3 - 3x^2 - 9x + 27$

b) $4x^3 + 4x^2 - 25x - 25$

c) $9x^3 + 18x^2 - 4x - 8$

6. Determine the value of b such that $x + 4$ is a factor of $2x^3 - 4x^2 + bx - 8$.

7. Determine the value of k such that $3x - 2$ is a factor of $x^3 + kx^2 - 5x + 3$.

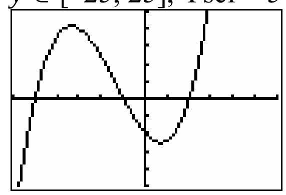
8. A rectangular box of crackers has a volume, in cubic centimetres, that can be modelled by the function $V(x) = x^3 - 33x^2 + 300x - 800$.

a) Determine the dimensions of the box in terms of x.

b) What are the possible dimensions of the box when $x = 25$?

2.3 Polynomial Equations

9. Use the graph to determine the roots of the corresponding polynomial equation. Window variables: $x \in [-6, 6]$, $y \in [-25, 25]$, Yscl = 5



10. Determine the x-intercepts of each polynomial function.

a) $y = 27x^3 - 64$

b) $f(x) = x^3 - 2x^2 + 16x - 32$

c) $g(x) = x^4 - 29x^2 + 100$

11. Determine the real roots of each polynomial equation.

a) $(x^2 - 3x - 10)(2x^2 + 8) = 0$

b) $(5x^2 - 125)(3x^3 - 81) = 0$

12. Use Technology Solve. Round answers to two decimal places.

a) $5x^3 + 2x^2 + 3x + 10 = 0$

b) $5x - 2x^3 = 18 - 9x^2$

c) $4x^4 + 3x^3 + 2x - 1 = 0$

13. Use Technology A small doll house has dimensions such that the width is 6 cm less than the height and the length is 3 cm less than 1.5 times the height.

a) Write an equation for the volume of the house.

b) Find the possible dimensions of the house, to two decimal places, if the volume is 8500 cm^3.

2.4 Families of Polynomial Functions

14. a) Determine an equation for the family of cubic functions with zeros $-\frac{1}{2}$, 2, and 6.

b) Write equations for two functions that belong to the family in part a).

c) Determine an equation for the member whose graph passes through the point $(-1, 42)$.

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15. a) Determine an equation, in simplified form, for the family of cubic functions with zeros –3 and $1 \pm \sqrt{6}$.

b) Determine an equation for the member of the family whose *y*-intercept is –10.

2.5 Solving Inequalities Using Technology

16. Use Technology Solve. Round answers to two decimal places, if necessary.

a) $x^3 - 5x^2 + 4x - 3 \geq 0$

b) $-3x^3 + 4x > 0$

c) $2x^4 + 5x^3 - x^2 + x - 3 \leq 0$

d) $4x^5 + 7x^3 - 2x + 10 < 0$

17. Sketch a graph of a cubic polynomial function $y = f(x)$ such that $f(x) < 0$ when $x < -5$ or $-3 < x < 2$ and $f(x) > 0$ when $-5 < x < -3$ or $x > 2$.

2.6 Solve Factorable Polynomial Inequalities Algebraically

18. Solve each inequality. Show the solution on a number line.

a) $(4x + 5)(x + 2) \geq 0$

b) $(3x - 1)(2x + 5)(3 - x) \leq 0$

c) $(4x^2 - 9)(x^2 + 6x + 9) > 0$

19. Solve.

a) $2x^2 - x - 15 < 0$

b) $-x^3 - x^2 + 9x + 9 > 0$

c) $x^4 - 4x^3 - 21x^2 + 100x - 100 \leq 0$