Name: _____   Date: _____

2.1 The Remainder Theorem

1. a) Divide $2x^3 - 3x^2 + x - 6$ by $x + 2$.
Express the result in quotient form.
b) Identify any restrictions on the variable.
c) Write the corresponding statement that can be used to check the division.
d) Verify your answer.

2. Perform each division. Express the result in quotient form. Identify any restrictions on the variable.
a) $x^3 + 2x^2 - 5x + 3$ divided by $x + 2$
b) $4x^3 + 3x - 4$ divided by $2x + 1$
c) $6x^3 - 9x^4 + 6x - 5$ divided by $3x - 2$
d) $8x^3 - 10x^2 - 21$ divided by $x - 3$

3. Determine the remainder R so that each statement is true.
a) $(3x - 2)(2x + 1) + R = 6x^2 - x - 7$
b) $(x + 5)(2x - 1)(x + 4) + R =$
$2x^3 + 17x^2 + 31x - 10$

4. The area, in square centimetres, of the base of a square-based box is
$4x^2 - 12x + 9$. Determine possible dimensions of the box if the volume, in cubic centimetres, is
$4x^3 - 28x^2 + 57x - 36$.

5. Use the remainder theorem to determine the remainder for each division.
a) $x^3 - 3x^2 + 5x - 2$ divided by $x - 4$
b) $3x^3 + x^2 - 4x + 10$ divided by $x + 3$
c) $x^4 + 2x^3 - 3x + 2$ divided by $x + 2$

6. a) Determine the value of c such that when $P(x) = 2x^3 - cx^2 + 4x - 7$ is divided by $x - 2$, the remainder is –3.
b) Use Technology Verify your answer in part a) using a computer algebra system.

7. For what value of k will the polynomial $f(x) = x^3 + 2x^2 + kx + 5$ have the same remainder when it is divided by $x + 1$ and $x - 2$?

8. Use the remainder theorem to determine the remainder when $x^4 + x^3 - 3x + 6$ is divided by $3x - 2$.

9. a) Use the remainder theorem to determine the remainder when
$4x^3 + 2x^2 - 6x + 1$ is divided by $2x - 1$.
b) Verify your answer in part a) using long division.
c) Use Technology Verify your answer in part a) using technology.

10. a) Determine the remainder when
$8x^3 + 2x^2 - x$ is divided by $2x + 1$.
b) Factor $8x^3 + 2x^2 - x$ fully.

11. When the polynomial $mx^3 + 5x^2 - nx - 1$ is divided by $x - 1$, the remainder is 2. When the same polynomial is divided by $x + 3$, the remainder is 10. Determine the values of m and n.