## Remainder Theorem

Remainder Theorem: If a polynomial $P(x)$ is divided by $x-c$, then the remainder is $P(c)$.

$$R = P(c)$$

Ways to Find the Remainder:

1. Use synthetic division.
2. Calculate $P(c)$.

**Practice Exercises**

A. Use synthetic division to find the remainder of the following polynomial functions.

1. $f(x) = -x^3 + 6x - 7$ at $x = 2$
2. $f(x) = x^3 + 3x^2 + 2x + 8$ at $x = -3$
3. $f(x) = x^4 + 3x^3 - 17x^2 + 2x - 7$ at $x = 3$
4. $f(x) = 3x^3 + 7x^2 - 18x + 8$ at $x = -4$
5. $f(x) = 2x^4 - 3x^3 - 3x - 2$ at $x = 2$

B. Use the remainder theorem to find the remainder of the following polynomial functions.

1. $f(x) = 4x^3 + 2x + 10$ at $x = -3$
2. $f(x) = 2x^3 + 4x^2 - 5x + 9$ at $x = -3$
3. $f(x) = 3x^3 - 7x^2 + 5x - 2$ at $x = -2$
4. $f(x) = 5x^3 + 7x^2 + 8$ at $x = -2$
5. $f(x) = 6x^2 + 3x - 9$ at $x = 1$

**Problem Set**

A. Use synthetic division to find the remainder of the following polynomial functions.

1. $f(x) = x^3 + x^2 - 5x - 6$ at $x = 2$
2. $f(x) = x^3 + 5x^2 + 10x + 12$ at $x = -2$
3. $f(x) = x^5 - 47x^3 - 16x^2 + 8x + 52$ at $x = 7$
4. $f(x) = x^4 - 2x^3 + x^2 - 4$ at $x = -1$
5. $f(x) = x^2 - 5x - 2$ at $x = -2$

B. Use the remainder theorem to find the remainder of the following polynomial functions.

1. $f(x) = 2x^3 - 5x^2 + 3x - 7$ at $x = 3$
2. $f(x) = 2x^3 - 9x^2 + 14x - 8$ at $x = -2$
3. $f(x) = 4x^4 + 5x^3 + 8x^2$ at $x = 4$
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