Homework 4.7: Remainder & Factor Theorems

Name: _____

Math 3

Directions: Use the Remainder Theorem to evaluate each function at the given value.

1) $f(x) = -x^3 + 6x - 7$ at $x = 2$

$$f(2) = -3$$

2) $f(x) = x^3 + x^2 - 5x - 6$ at $x = 2$

$$f(2) = -4$$

3) $f(a) = a^3 + 3a^2 + 2a + 8$ at $a = -3$

$$f(-3) = 2$$

4) $f(a) = a^3 + 5a^2 + 10a + 12$ at $a = -2$

$$f(-2) = 4$$

5) $f(a) = a^4 + 3a^3 - 17a^2 + 2a - 7$ at $a = 3$

$$f(3) = 8$$

6) $f(x) = x^5 - 47x^3 - 16x^2 + 8x + 52$ at $x = 7$

$$f(7) = 10$$

Directions: State if the given binomial is a factor of the given polynomial.

7) $(k^3 - k^2 - k - 2) \div (k - 2)$

$$f(2) = 0 \quad \text{yes!}$$

8) $(b^4 - 8b^3 - b^2 + 62b - 34) \div (b - 7)$

$$f(7) = 8 \quad \text{NO!}$$

9) $(n^4 + 9n^3 + 14n^2 + 50n + 9) \div (n + 8)$

$$f(-8) = -7 \quad \text{NO!}$$

10) $(p^4 + 6p^3 + 11p^2 + 29p - 13) \div (p + 5)$

$$f(-5) = -8 \quad \text{NO!}$$

11) $(p^4 - 8p^3 + 10p^2 + 2p + 4) \div (p - 2)$

$$f(2) = 0 \quad \text{yes!}$$

12) $(n^5 - 25n^3 - 7n^2 - 37n - 18) \div (n + 5)$

$$f(-5) = -8 \quad \text{NO!}$$

13) $(x^5 + 6x^4 - 3x^2 - 22x - 29) \div (x + 6)$

$$f(-6) = -5 \quad \text{NO!}$$

14) $(n^4 + 10n^3 + 21n^2 + 6n - 8) \div (n + 2)$

$$f(-2) = 0 \quad \text{yes!}$$

Directions: Divide the following.

15) $(p^4 + 5p^3 - 11p^2 - 25p + 29) \div (p + 6)$

```
-6 | 1    5   -11   -25   29
   ↓     -6    6    30   -30
   ------------------------
     1   -1   -5    5   (-1)
```

$$x^3 - x^2 - 5x + 5 + \frac{-1}{x+6}$$

16) $(8k^3 - 66k^2 + 14k + 8) \div (k - 8)$

```
8 | 8   -66   14    8
  ↓      64  -16  -16
  --------------------
    8   -2   -2  (-8)
```

$$8x^2 - 2x - 2 + \frac{-8}{x-8}$$

17) $(x^4 + 11x^3 + 33x^2 + 24x + 32) \div (x + 6)$

```
-6 | 1   11   33   24   32
   ↓     -6  -30  -18  -36
   ----------------------
     1    5    3    6  (-4)
```

$$x^3 + 5x^2 + 3x + 6 + \frac{-4}{x+6}$$

18) $(6v^3 + 42v^2 - 50v - 20) \div (v + 8)$

```
-8 | 6   42   -50   -20
   ↓     -48  +48   +16
   --------------------
     6   -6   -2   (-4)
```

$$6x^2 - 6x - 2 + \frac{-4}{x+8}$$