Unit 5 HW 9 Review

Decide whether each function below is a polynomial. If it is, write the function in standard form. If it is not, explain why.

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

yes,

$f(x) = 5x^4 - 2x^2 - 3x + 8$

2. $f(x) = (1/x^2) + (1/x) + x^2$

No, variable in denominator

Polynomials can be classified by the number terms as well as by the degree of the polynomial. The degree of the polynomial is the same as the term with the highest degree. Complete the following chart.

Polynomial	Number of terms	Classification	Degree	classification
$f(x) = 8x + 3x^2 - 5$	**3.** 3	**4.** Trinomial	**5.** 2	**6.** Quadratic
$f(x) = x^3 - x^4 + x + 3$	**7.** 4	**8.** Polynomial	**9.** 4	**10.** Quartic
$f(x) = 64x^2 + 1$	**11.** 2	**12.** Binomial	**13.** 2	**14.** Quadratic

Find the sum, difference or product of the following. Write the answer in standard form.

15. $(x^2 + 2x + 7) + (3x^2 + 4x)$

$\boxed{4x^2 + 6x + 7}$

16. $(2x^4 + 3x^3 + 6) - (x^4 + 4x^3 + 13x^2 + 2)$

$+ \underline{-x^4 - 4x^3 - 13x^2 - 2}$

$\boxed{= x^4 - x^3 - 13x^2 + 4}$

17. $(x + 2)(x + 1)$

$x^2 + x + 2x + 2$

$\boxed{= x^2 + 3x + 2}$

18. $(-3x - 2)(3x^2 - x + 1)$

$-9x^3 + \boxed{3x^2} - 3x \boxed{-6x^2} + 2x - 2$

$\boxed{= -9x^3 - 3x^2 - x - 2}$

19. $2ab(a^3 + 3ab^2 - b^3)$

$\boxed{= 2a^4b + 6a^2b^3 - 2ab^4}$

20. $(2x - 1)^2$

$\boxed{= 4x^2 - 4x + 1}$

21. $(30 + x^3 + x^2)(x - 15 - x^2)$

$30x - 450 - 30x^2 + x^4 - 15x^3 - x^5 + x^2 - 15x^2 - x^4$

$= -x^5 - 14x^3 - 45x^2 + 30x - 450$

22. $(2x - 5)(2x + 5)$

$= 4x^2 + 10x - 10x - 25$

$= 4x^2 - 25$

Find the quotient of the following using polynomial synthetic division.

23. $(x^2 - 5x - 20) \div (x - 4)$

```
4 | 1   -5   -20
  |      4    -4
  -----------------
    1   -1   |-24
```
$x - 1 \frac{-24}{x-4}$

24. $(3x^3 + 16x^2 + 18x + 8) \div (x + 4)$

```
-4 | 3    16    18    8
   |     -12   -16   -8
   ----------------------
     3    4     2   | 0
```
$= 3x^2 + 4x + 2$

Find the quotient of the following using polynomial long division.

25. $(10x + 2x^2 + 8) \div (2x + 2)$

$$\begin{array}{r} x + 4 \\ 2x+2 \overline{\smash{\big)}\ 2x^2 + 10x + 8} \\ \underline{-(2x^2 + 2x)} \downarrow \\ 8x + 8 \\ \underline{-(8x + 8)} \\ 0 \end{array}$$

26. $(x^4 - 5x + 10) \div (x + 3)$

$$\begin{array}{r} x^3 - 3x^2 + 9x - 32 + \frac{106}{x+3} \\ x+3 \overline{\smash{\big)}\ x^4 + 0x^3 + 0x^2 - 5x + 10} \\ \underline{-(x^4 + 3x^3)} \downarrow \\ -3x^3 + 0x^2 \\ \underline{-(+3x^3 + 9x^2)} \downarrow \\ 9x^2 - 5x \\ \underline{-(9x^2 + 27x)} \downarrow \\ -32x + 10 \\ \underline{-(+32x + 96)} \\ 106 \end{array}$$

Find the inverse of the given function.

27. $f(x) = \frac{7 - 8x}{3}$

$3x - 7 = -8y$

$\frac{-8}{-8}$

$3 \cdot x = \frac{7 - 8y}{3}$

$3x = 7 - 8y$

$3x = 7 - 8y$

$f^{-1}(x) = -\frac{3}{8}x + \frac{7}{8}$

28. $f(x) = 5 + \sqrt{x + 8}$

$x = 5 + \sqrt{y + 8}$

$(x - 5)^2 = (\sqrt{y+8})^2$

$(x - 5)^2 = y + 8$

$y = \pm(x-5)^2 - 8$

$f^{-1}(x) = \pm(x - 5)^2 - 8$

Expand each binomial using the Pascal's Triangle and find the given term.

29. $(-6x + 2)^3$; term 3

1 3 3 1

1	3	3	1
$(-6x)^3$	$(-6x)^2$	$(-6x)^1$	1
1	$(2)^1$	$(2)^2$	$(2)^3$

term 3 = $-72x$

$-216x^3 + 216x^2 - 72x + 8$ Expand

30. $(3x + y)^5$; term 4

1 5 10 10 5 1

1	5	10	10	5	1
$(3x)^5$	$(3x)^4$	$(3x)^3$	$(3x)^2$	$(3x)^1$	1
1	y^1	y^2	y^3	y^4	y^5

term 4

$90x^2y^3$

$243x^5 + 405xy^4 + 270x^3y^2 + 90x^2y^3 + 15xy^4 + y^5$

Expand

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1