Algebra 2

Name_____ ID: 1

Unit 4 Review

Date_____ Period____

Simplify each expression.

1) $\left(8a - 7a^3 - 6\right) - \left(4a - 4 - 5a^3\right)$

2) $\left(2 - 8p^4 + 3p^2\right) + \left(2p^4 + p^2 - 1\right)$

Name each polynomial by degree and number of terms.

3) $6x^5 + 3x^4 - 9x^3$

4) $-4b^2$

5) $7 - 8b$

6) $-10n^2 + 2n^3 - 3n^4$

Find each product.

7) $\left(4m - 7\right)^2$

8) $\left(8a - 7\right)\left(5a^2 - 3a - 3\right)$

State the number of complex roots for each equation.

9) $\left(x + 1\right)\left(x^2 - x + 1\right) = 0$

10) $x\left(x^2 - 7\right)\left(x^2 + 9\right) = 0$

Divide.

11) $\left(6n^3 - 43n^2 + 16n - 71\right) \div \left(n - 7\right)$

12) $\left(9x^3 + 40x + 37x^2 + 4\right) \div \left(9x + 1\right)$

Factor each completely.

13) $8x^3 + 27$

14) $27x^3 - 64$

15) $x^4 - 16x^2 + 63$

16) $a^5 - 2a^3 - 35a$

17) $3x^4 + 22x^2 + 35$

18) $7x^4 - x^2 - 6$

19) $14a^3 - 35a^2 + 2a - 5$

20) $30x^3 + 48x^2 + 40x + 64$

Evaluate #21 with direct substitution and #22 with synthetic substitution.

21) $f(a) = a^4 - 3a^2 + 3a - 1$ at $a = -2$

22) $f(m) = m^3 - 6m^2 + 10m$ at $m = 2$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

23) $-2i, \quad 3i$

24) $\sqrt{6}, \quad i$

Find all zeros.

25) $f(x) = (x - 2)(x + 2)(x^2 + 5)$

26) $f(x) = (x - 1)^2(x + 11)$

State the possible rational zeros for each function.

27) $f(x) = 2x^3 + 9x^2 - 12x - 8$

28) $f(x) = x^3 + 12x^2 + 34x + 21$

Find all roots. One root has been given.

29) $x^3 + x^2 - 25x - 25 = 0; \quad 5$

30) $x^3 + 10x^2 + 31x + 30 = 0; \quad -2$

Find all roots. One factor has been given.

31) $x^3 + 8x^2 + 20x + 16 = 0; \quad x + 2$

32) $x^3 - 3x^2 - 10x + 24 = 0; \quad x - 2$

Find all roots.

33) $x^3 - 1 = 0$

34) $x^3 + 64 = 0$

35) $2x^3 - 3x^2 + x = 0$

36) $2x^3 + x^2 - 5x + 2 = 0$

Find all zeros.

37) $f(x) = x^3 + 4x^2 - x - 10$

38) $f(x) = 2x^3 + 2x^2 + 9x$

Simplify. Your answer should contain only positive exponents.

39) $\left(\dfrac{m^3}{2m^2 \cdot 2m^2} \right)^4$

40) $\dfrac{\left(b^3 \right)^{-1}}{b^4 \cdot 2b}$

41) $\left(b^{-3} \right)^2 \cdot ab$

42) $\left(2b^2 \right)^3 \cdot 2a^3 b^{-2}$

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Simplify each expression.

1) $(8a - 7a^3 - 6) - (4a - 4 - 5a^3)$

$-2a^3 + 4a - 2$

2) $(2 - 8p^4 + 3p^2) + (2p^4 + p^2 - 1)$

$-6p^4 + 4p^2 + 1$

Name each polynomial by degree and number of terms.

3) $6x^5 + 3x^4 - 9x^3$

quintic trinomial

4) $-4b^2$

quadratic monomial

5) $7 - 8b$

linear binomial

6) $-10n^2 + 2n^3 - 3n^4$

quartic trinomial

Find each product.

7) $(4m - 7)^2$

$16m^2 - 56m + 49$

8) $(8a - 7)(5a^2 - 3a - 3)$

$40a^3 - 59a^2 - 3a + 21$

State the number of complex roots for each equation.

9) $(x + 1)(x^2 - x + 1) = 0$

3

10) $x(x^2 - 7)(x^2 + 9) = 0$

5

Divide.

11) $\left(6n^3 - 43n^2 + 16n - 71\right) \div \left(n - 7\right)$

$6n^2 - n + 9 - \dfrac{8}{n - 7}$

12) $\left(9x^3 + 40x + 37x^2 + 4\right) \div \left(9x + 1\right)$

$x^2 + 4x + 4$

Factor each completely.

13) $8x^3 + 27$

$\left(2x + 3\right)\left(4x^2 - 6x + 9\right)$

14) $27x^3 - 64$

$\left(3x - 4\right)\left(9x^2 + 12x + 16\right)$

15) $x^4 - 16x^2 + 63$

$\left(x^2 - 7\right)\left(x - 3\right)\left(x + 3\right)$

16) $a^5 - 2a^3 - 35a$

$a\left(a^2 + 5\right)\left(a^2 - 7\right)$

17) $3x^4 + 22x^2 + 35$

$\left(3x^2 + 7\right)\left(x^2 + 5\right)$

18) $7x^4 - x^2 - 6$

$\left(7x^2 + 6\right)\left(x - 1\right)\left(x + 1\right)$

19) $14a^3 - 35a^2 + 2a - 5$

$\left(7a^2 + 1\right)\left(2a - 5\right)$

20) $30x^3 + 48x^2 + 40x + 64$

$2\left(3x^2 + 4\right)\left(5x + 8\right)$

Evaluate #21 with direct substitution and #22 with synthetic substitution.

21) $f(a) = a^4 - 3a^2 + 3a - 1$ at $a = -2$

-3

22) $f(m) = m^3 - 6m^2 + 10m$ at $m = 2$

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Write a polynomial function of least degree with integral coefficients that has the given zeros.

23) $-2i, \quad 3i$

$$f(x) = x^4 + 13x^2 + 36$$

24) $\sqrt{6}, \quad i$

$$f(x) = x^4 - 5x^2 - 6$$

Find all zeros.

25) $f(x) = (x-2)(x+2)(x^2+5)$

$$\{2, -2, i\sqrt{5}, -i\sqrt{5}\}$$

26) $f(x) = (x-1)^2(x+11)$

$$\{1 \text{ mult. } 2, -11\}$$

State the possible rational zeros for each function.

27) $f(x) = 2x^3 + 9x^2 - 12x - 8$

$$\pm 1, \pm 2, \pm 4, \pm 8, \pm \frac{1}{2}$$

28) $f(x) = x^3 + 12x^2 + 34x + 21$

$$\pm 1, \pm 3, \pm 7, \pm 21$$

Find all roots. One root has been given.

29) $x^3 + x^2 - 25x - 25 = 0; \quad 5$

$$\{-1, -5, 5\}$$

30) $x^3 + 10x^2 + 31x + 30 = 0; \quad -2$

$$\{-3, -5, -2\}$$

Find all roots. One factor has been given.

31) $x^3 + 8x^2 + 20x + 16 = 0; \quad x+2$

$$\{-4, -2 \text{ mult. } 2\}$$

32) $x^3 - 3x^2 - 10x + 24 = 0; \quad x-2$

$$\{-3, 4, 2\}$$

Find all roots.

33) $x^3 - 1 = 0$

$$\left\{1, \frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}\right\}$$

34) $x^3 + 64 = 0$

$$\left\{-4, 2 + 2i\sqrt{3}, 2 - 2i\sqrt{3}\right\}$$

35) $2x^3 - 3x^2 + x = 0$

$$\left\{0, \frac{1}{2}, 1\right\}$$

36) $2x^3 + x^2 - 5x + 2 = 0$

$$\left\{\frac{1}{2}, -2, 1\right\}$$

Find all zeros.

37) $f(x) = x^3 + 4x^2 - x - 10$

$$\left\{-2, -1 + \sqrt{6}, -1 - \sqrt{6}\right\}$$

38) $f(x) = 2x^3 + 2x^2 + 9x$

$$\left\{0, \frac{-1 + i\sqrt{17}}{2}, \frac{-1 - i\sqrt{17}}{2}\right\}$$

Simplify. Your answer should contain only positive exponents.

39) $\left(\dfrac{m^3}{2m^2 \cdot 2m^2}\right)^4$

$$\frac{1}{256m^4}$$

40) $\dfrac{\left(b^3\right)^{-1}}{b^4 \cdot 2b}$

$$\frac{1}{2b^8}$$

41) $\left(b^{-3}\right)^2 \cdot ab$

$$\frac{a}{b^5}$$

42) $\left(2b^2\right)^3 \cdot 2a^3 b^{-2}$

$$16a^3 b^4$$

-4-