

## Spring Final Exam Review 16-17

Name each polynomial by degree and number of terms.

1)  $-5m^3 + 5m^4 + 10m^6$

2)  $-9x^3 - 9x^2$

Describe the end behavior of each function.

3)  $f(x) = -x^4 - 2x^3 + 2x^2 - 7$

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

Factor each.

5)  $x^6 - 4x^4 - 9x^2 + 36 = 0$

6)  $x^7 - x^5 - 25x^3 + 25x = 0$

7)  $x^3 + 64 = 0$

8)  $x^3 - 27 = 0$

Simplify each expression.

9)  $(6v + v^3 + 6v^4) + (7v^3 + 5v^4 - 7v)$

10)  $(8x^4 - 5x^2 + x^3) - (x^3 + 7x^4 + 4x^2)$

Find each product.

11)  $(3m + 5)(8m^2 - 3m + 8)$

12)  $(7p + 3)(5p^2 - 7p + 8)$

13)  $(x^2 - 6x + 5)(x^2 + 6x + 7)$

14)  $(3n^2 + 5n - 7)(5n^2 - 2n + 7)$

**Divide using synthetic division**

15)  $(r^3 + 13r^2 + 30r - 50) \div (r + 5)$

16)  $(9m^3 + 18m^2 + 3) \div (m + 2)$

**Divide using long division.**

17)  $(-12x^3 - 13x^2 + 69x - 67) \div (3x + 10)$

18)  $(40n^3 + 37n^2 - 59n + 18) \div (5n - 1)$

19) Which polynomial equation has roots at: -2,  
3i

20) Which polynomial equation has roots at:  
 $\sqrt{3}, 2i$

**Solve each system of equations.**

21)  $3y^2 - 3x - 12y - 3 = 0$   
 $x + 3y = 1$

22)  $4y^2 + 3x + 9y - 1 = 0$   
 $x + 3y + 1 = 0$

23)  $-2y^2 - 3x - y + 96 = 0$   
 $x + y = 4$

24)  $x^2 - 11x + y + 38 = 0$   
 $2x + y - 4 = 0$

**Simplify.**

25)  $\left(\frac{4}{b^3}\right)^{\frac{5}{4}}$

26)  $(v^2)^{\frac{3}{4}}$

**Simplify. Your answer should contain only positive exponents.**

27)  $4y^2 \cdot 3x^2y^{-1}$

28)  $4xy^{-4} \cdot 3x^{-4}y^4$

**Factor each completely.**

29)  $r^2 + 2r - 15$

30)  $x^2 + 3x - 54$

31)  $7x^2 - 64x + 64$

32)  $5b^2 + 13b + 6$

**Solve each equation by taking square roots.**

33)  $1 + 100r^2 = 5$

34)  $36x^2 + 8 = 33$

**Solve each equation by factoring.**

35)  $5k^2 + 18k - 35 = 0$

36)  $7b^2 - 50b + 48 = 0$

**Solve each equation.**

37)  $81^{-3n} = 3^5$

38)  $9^p = 3^3$

39) If  $f(x) = 2^x$  is changed to  $f(x) = -2^{x+3} + 1$ , what transformations of the graph occurs?

**Solve each equation.**

40)  $125 = (3x + 4)^{\frac{3}{2}}$

41)  $-2 + x^{\frac{3}{2}} = 25$

**Simplify.**

42)  $\sqrt{16x^2y^2z^3}$

43)  $\sqrt{108hjk^2}$

Solve each equation. Remember to check for extraneous solutions.

$$44) \sqrt{27n} = 9$$

$$45) 8 = \sqrt{p - 3}$$

46) If  $y = \frac{1}{x}$  is changed to  $y = \frac{2}{x} - 2$ , what transformation of the graph occurs?

Simplify each expression.

$$47) \frac{b^2 + 2b - 3}{b^2 - 3b + 2}$$

$$48) \frac{4n - 4}{10n + 8}$$

$$49) \frac{6k + 6}{k + 1} \cdot \frac{4k^2}{k - 9}$$

$$50) \frac{n^2 - 2n - 3}{n + 1} \cdot \frac{n + 1}{n^2 + 10n + 9}$$

$$51) \frac{5x^3 - 50x^2}{3x^2} \cdot \frac{3x^2}{x^2 - 20x + 100}$$

$$52) \frac{1}{8p^2 - 48p} \cdot \frac{p^2 - 11p + 30}{p - 6}$$

$$53) \frac{10 - 25m}{25m - 10} \div \frac{30m - 30}{25m - 25}$$

$$54) \frac{n^2 - 2n + 1}{n - 1} \div \frac{4n^3 - 4n^2}{5n - 10}$$

$$55) \frac{r^2 - 11r + 18}{r^2 - 12r + 27} \div \frac{r^2 + 5r - 14}{r^2 - 11r + 24}$$

$$56) \frac{10x + 60}{x^2 + 5x - 6} \div \frac{x^2 + 16x + 64}{x^2 + 7x - 8}$$

57)  $\frac{2}{x+3} + \frac{5x}{2x-5}$

58)  $\frac{n-2}{2n-1} - \frac{6n}{5n^2}$

**Solve each equation. Remember to check for extraneous solutions.**

59)  $\frac{k-1}{k} = \frac{1}{6k} + \frac{5}{3}$

60)  $\frac{1}{6a} + 1 = \frac{a-5}{6a}$

61) Which type of variation is represented by the equation  $yx = 6$ ?

62)  $y$  varies inversely with  $x$  and  $y = -3$  when  $x = 4$ , find  $x$  when  $y = 12$ .

63)  $y$  varies directly with  $x$  and  $y = 12$  when  $x = 4$ , find  $x$  when  $y = 3$

**Evaluate each expression.**

64)  $\log_6 1$

65)  $\log_4 64$

66)  $\log_{32} 2$

67)  $\log_6 \frac{1}{36}$

**Solve each equation.**

68)  $\log_4 (-5x + 10) = \log_4 5x$

69)  $\log_7 (-3r + 5) = \log_7 -4r$

$$70) \log_7 r = 0$$

$$71) \log_{11} n = 1$$

$$72) \log_9 m = 2$$

$$73) \log_7 x = 2$$

$$74) \log_5 3x - \log_5 6 = \log_5 74$$

$$75) \log 5 + \log -5x = \log 22$$

$$76) \log_4 10 + \log_4 -5x = 1$$

$$77) \log_4 (x + 1) - \log_4 10 = \log_4 12$$

$$78) \log 5x - \log 7 = 1$$

$$79) \log 3x - \log 3 = \log 15$$

$$80) \log -4x - \log 8 = 1$$

$$81) \log -3x - \log 9 = \log 16$$

$$82) 216^{3p} = 36$$

$$83) 125^{-3k} = 25^{3k}$$

$$84) 125^{2x-2} = 625$$

$$85) 216^{-n-1} = 36$$

86) Use the formula  $A = Pe^{rt}$ . How much money would you have if you invested \$6,000 for 5 years, compounded continuously, at a rate of 9%?

## Spring Final Exam Review 16-17

Name each polynomial by degree and number of terms.

1)  $-5m^3 + 5m^4 + 10m^6$

sixth degree trinomial

2)  $-9x^3 - 9x^2$

cubic binomial

Describe the end behavior of each function.

3)  $f(x) = -x^4 - 2x^3 + 2x^2 - 7$

$f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$

$f(x) \rightarrow -\infty$  as  $x \rightarrow +\infty$

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

$f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty$

$f(x) \rightarrow +\infty$  as  $x \rightarrow +\infty$

Factor each.

5)  $x^6 - 4x^4 - 9x^2 + 36 = 0$

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

6)  $x^7 - x^5 - 25x^3 + 25x = 0$

$x(x - 1)(x + 1)(x^2 - 5)(x^2 + 5) = 0$

7)  $x^3 + 64 = 0$

$(x + 4)(x^2 - 4x + 16) = 0$

8)  $x^3 - 27 = 0$

$(x - 3)(x^2 + 3x + 9) = 0$

Simplify each expression.

9)  $(6v + v^3 + 6v^4) + (7v^3 + 5v^4 - 7v)$

$11v^4 + 8v^3 - v$

10)  $(8x^4 - 5x^2 + x^3) - (x^3 + 7x^4 + 4x^2)$

$x^4 - 9x^2$

Find each product.

11)  $(3m + 5)(8m^2 - 3m + 8)$

$24m^3 + 31m^2 + 9m + 40$

12)  $(7p + 3)(5p^2 - 7p + 8)$

$35p^3 - 34p^2 + 35p + 24$

13)  $(x^2 - 6x + 5)(x^2 + 6x + 7)$

$x^4 - 24x^2 - 12x + 35$

14)  $(3n^2 + 5n - 7)(5n^2 - 2n + 7)$

$15n^4 + 19n^3 - 24n^2 + 49n - 49$

**Divide using synthetic division**

$$15) (r^3 + 13r^2 + 30r - 50) \div (r + 5)$$

$$r^2 + 8r - 10$$

$$16) (9m^3 + 18m^2 + 3) \div (m + 2)$$

$$9m^2 + \frac{3}{m + 2}$$

**Divide using long division.**

$$17) (-12x^3 - 13x^2 + 69x - 67) \div (3x + 10)$$

$$-4x^2 + 9x - 7 + \frac{3}{3x + 10}$$

$$18) (40n^3 + 37n^2 - 59n + 18) \div (5n - 1)$$

$$8n^2 + 9n - 10 + \frac{8}{5n - 1}$$

19) Which polynomial equation has roots at: -2, 3i

$$x^3 + 2x^2 + 9x + 18$$

20) Which polynomial equation has roots at:  $\sqrt{3}$ , 2i

$$x^4 + x^2 - 12$$

**Solve each system of equations.**

$$21) \begin{cases} 3y^2 - 3x - 12y - 3 = 0 \\ x + 3y = 1 \end{cases}$$

$$(4, -1), (-5, 2)$$

$$22) \begin{cases} 4y^2 + 3x + 9y - 1 = 0 \\ x + 3y + 1 = 0 \end{cases}$$

$$(-4, 1), (2, -1)$$

$$23) \begin{cases} -2y^2 - 3x - y + 96 = 0 \\ x + y = 4 \end{cases}$$

$$(-3, 7), (10, -6)$$

$$24) \begin{cases} x^2 - 11x + y + 38 = 0 \\ 2x + y - 4 = 0 \end{cases}$$

$$(6, -8), (7, -10)$$

**Simplify.**

$$25) \left( \frac{4}{b^3} \right)^{\frac{5}{4}}$$

$$\frac{5}{b^3}$$

$$26) (v^2)^{\frac{3}{4}}$$

$$v^{\frac{3}{2}}$$

**Simplify. Your answer should contain only positive exponents.**

$$27) 4y^2 \cdot 3x^2y^{-1}$$

$$12x^2y$$

$$28) 4xy^{-4} \cdot 3x^{-4}y^4$$

$$\frac{12}{x^3}$$



**Factor each completely.**

29)  $r^2 + 2r - 15$

$(r - 3)(r + 5)$

30)  $x^2 + 3x - 54$

$(x - 6)(x + 9)$

31)  $7x^2 - 64x + 64$

$(7x - 8)(x - 8)$

32)  $5b^2 + 13b + 6$

$(5b + 3)(b + 2)$

**Solve each equation by taking square roots.**

33)  $1 + 100r^2 = 5$

$\left\{ \frac{1}{5}, -\frac{1}{5} \right\}$

34)  $36x^2 + 8 = 33$

$\left\{ \frac{5}{6}, -\frac{5}{6} \right\}$

**Solve each equation by factoring.**

35)  $5k^2 + 18k - 35 = 0$

$\left\{ \frac{7}{5}, -5 \right\}$

36)  $7b^2 - 50b + 48 = 0$

$\left\{ \frac{8}{7}, 6 \right\}$

**Solve each equation.**

37)  $81^{-3n} = 3^5$

$\left\{ -\frac{5}{12} \right\}$

38)  $9^p = 3^3$

$\left\{ \frac{3}{2} \right\}$

39) If  $f(x) = 2^x$  is changed to  $f(x) = -2^{x+3} + 1$ , what transformations of the graph occurs?

The graph is translated left 3 units and up 1 unit and reflected across x axis.

**Solve each equation.**

40)  $125 = (3x + 4)^{\frac{3}{2}}$

$\{7\}$

41)  $-2 + x^{\frac{3}{2}} = 25$

$\{9\}$

**Simplify.**

42)  $\sqrt{16x^2y^2z^3}$

$4xyz\sqrt{z}$

43)  $\sqrt{108hjk^2}$

$6k\sqrt{3hj}$

Solve each equation. Remember to check for extraneous solutions.

$$44) \sqrt{27n} = 9$$
$$\{3\}$$

$$45) 8 = \sqrt{p-3}$$
$$\{67\}$$

46) If  $y = \frac{1}{x}$  is changed to  $y = \frac{2}{x} - 2$ , what transformation of the graph occurs?

The graph is translated down 2 units and vertically stretched by a factor of 2

Simplify each expression.

$$47) \frac{b^2 + 2b - 3}{b^2 - 3b + 2}$$
$$\frac{b+3}{b-2}$$

$$48) \frac{4n-4}{10n+8}$$
$$\frac{2(n-1)}{5n+4}$$

$$49) \frac{6k+6}{k+1} \cdot \frac{4k^2}{k-9}$$
$$\frac{24k^2}{k-9}$$

$$50) \frac{n^2 - 2n - 3}{n+1} \cdot \frac{n+1}{n^2 + 10n + 9}$$
$$\frac{n-3}{n+9}$$

$$51) \frac{5x^3 - 50x^2}{3x^2} \cdot \frac{3x^2}{x^2 - 20x + 100}$$
$$\frac{5x^2}{x-10}$$

$$52) \frac{1}{8p^2 - 48p} \cdot \frac{p^2 - 11p + 30}{p-6}$$
$$\frac{p-5}{8p(p-6)}$$

$$53) \frac{10 - 25m}{25m - 10} \div \frac{30m - 30}{25m - 25}$$
$$-\frac{5}{6}$$

$$54) \frac{n^2 - 2n + 1}{n-1} \div \frac{4n^3 - 4n^2}{5n - 10}$$
$$\frac{5(n-2)}{4n^2}$$

$$55) \frac{r^2 - 11r + 18}{r^2 - 12r + 27} \div \frac{r^2 + 5r - 14}{r^2 - 11r + 24}$$
$$\frac{r-8}{r+7}$$

$$56) \frac{10x + 60}{x^2 + 5x - 6} \div \frac{x^2 + 16x + 64}{x^2 + 7x - 8}$$
$$\frac{10}{x+8}$$

$$57) \frac{2}{x+3} + \frac{5x}{2x-5}$$

$$\frac{19x - 10 + 5x^2}{(2x-5)(x+3)}$$

$$58) \frac{n-2}{2n-1} - \frac{6n}{5n^2}$$

$$\frac{5n^2 - 22n + 6}{5n(2n-1)}$$

**Solve each equation. Remember to check for extraneous solutions.**

$$59) \frac{k-1}{k} = \frac{1}{6k} + \frac{5}{3}$$

$$\left\{ -\frac{7}{4} \right\}$$

$$60) \frac{1}{6a} + 1 = \frac{a-5}{6a}$$

$$\left\{ -\frac{6}{5} \right\}$$

61) Which type of variation is represented by the equation  $yx = 6$ ?

inverse

62)  $y$  varies inversely with  $x$  and  $y = -3$  when  $x = 4$ , find  $x$  when  $y = 12$ .

-1

63)  $y$  varies directly with  $x$  and  $y = 12$  when  $x = 4$ , find  $x$  when  $y = 3$

1

**Evaluate each expression.**

$$64) \log_6 1$$

$$0$$

$$65) \log_4 64$$

$$3$$

$$66) \log_{32} 2$$

$$\frac{1}{5}$$

$$67) \log_6 \frac{1}{36}$$

$$-2$$

**Solve each equation.**

$$68) \log_4 (-5x + 10) = \log_4 5x$$

$$\{1\}$$

$$69) \log_7 (-3r + 5) = \log_7 -4r$$

$$\{-5\}$$

70)  $\log_7 r = 0$

$\{1\}$

71)  $\log_{11} n = 1$

$\{11\}$

72)  $\log_9 m = 2$

$\{81\}$

73)  $\log_7 x = 2$

$\{49\}$

74)  $\log_5 3x - \log_5 6 = \log_5 74$

$\{148\}$

75)  $\log 5 + \log -5x = \log 22$

$\left\{-\frac{22}{25}\right\}$

76)  $\log_4 10 + \log_4 -5x = 1$

$\left\{-\frac{2}{25}\right\}$

77)  $\log_4 (x + 1) - \log_4 10 = \log_4 12$

$\{119\}$

78)  $\log 5x - \log 7 = 1$

$\{14\}$

79)  $\log 3x - \log 3 = \log 15$

$\{15\}$

80)  $\log -4x - \log 8 = 1$

$\{-20\}$

81)  $\log -3x - \log 9 = \log 16$

$\{-48\}$

82)  $216^{3p} = 36$

$\left\{\frac{2}{9}\right\}$

83)  $125^{-3k} = 25^{3k}$

$\{0\}$

84)  $125^{2x-2} = 625$

$\left\{\frac{5}{3}\right\}$

85)  $216^{-n-1} = 36$

$\left\{-\frac{5}{3}\right\}$

86) Use the formula  $A = Pe^{rt}$ . How much money would you have if you invested \$6,000 for 5 years, compounded continuously, at a rate of 9%?

$\{ \$9,409.87 \}$