Accelerated Math 3 **Name** _____

Review Concepts - Answers **Date** _____ **Period** _____

Simplify the expression. Assume all variables are positive.

1. $(2x-4y)^2$

   $4x^2-16xy+16y^2$

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

   $27x^3-27x^2+9x-1$

3. $\sqrt{45}$

   $3\sqrt{5}$

4. $\sqrt{27xy}\cdot\sqrt{5y^3}$

   $3y^2\sqrt{15x}$

5. $\dfrac{4}{\sqrt{5}}$

   $\dfrac{4\sqrt{5}}{5}$

6. $\sqrt{5}\left(8\sqrt{10}+1\right)$

   $40\sqrt{2}+\sqrt{5}$

7. $\dfrac{1}{5+\sqrt{3}}$

   $\dfrac{5-\sqrt{3}}{22}$

8. $\sqrt{-25}$

   $5i$

9. $\dfrac{3}{\sqrt[3]{9x}}$

   $\dfrac{\sqrt[3]{3x^2}}{x}$

10. $\left(\dfrac{2m^3}{6m^{-5}n^2}\right)\left(\dfrac{-9n^{-2}}{m^4}\right)$

    $-\dfrac{3m^4}{n^4}$

11. $\left(\dfrac{x^4y^{-3}}{-2x^{-2}y^{-2}}\right)^{-3}$

    $-\dfrac{18y^3}{x^{18}}$

12. $\sqrt[3]{27}\cdot\sqrt[3]{16}$

    $6\sqrt[3]{6}$

13. $\left(\sqrt{6}\cdot\sqrt[3]{6}\right)^6$

    $6^5=7776$

14. $\dfrac{\sqrt[3]{64x^3y}}{4x^{-3}y}$

    $\dfrac{x^4\sqrt[3]{y}}{y}$

15. $\left(x^{\sqrt{2}}\right)^{3\sqrt{2}}$

    x^6

16. $\dfrac{3x}{x-\sqrt{2y}}$

    $\dfrac{3x^2-3x\sqrt{2y}}{x^2-2y}$

17. $y^3\sqrt[5]{32x^4}-7\sqrt[5]{x^4y^{15}}$

    $-5y^3\sqrt[5]{x^4}$

18. $\dfrac{\dfrac{x-3}{2}}{\dfrac{4x+5}{5x}}$

    $\dfrac{5x^2-15x}{8x+10}$

Write the expression as a complex number in standard form without using a calculator.

19. $(6+3i)^2$

    $27+36i$

20. $4i(2+i)(5-2i)$

    $-4+48i$

21. $\dfrac{2-7i}{3i}$

    $-\dfrac{7}{3}-\dfrac{2}{3}i$

22. $\dfrac{3+4i}{2+3i}$

    $\dfrac{18}{13}-\dfrac{1}{13}i$

23. $\dfrac{(3+3i)}{(2-4i)^2}$

    $-\dfrac{21}{100}+\dfrac{3}{100}i$

Simplify the following powers of i without using a calculator.

24. i^{10}

    -1

25. i^{51}

    $-i$

26. i^{2364}

    1

Evaluate the expression without using a calculator.

27. $8^{\frac{2}{3}}$

4

28. $16^{-\frac{3}{2}}$

$\frac{1}{64}$

29. $(-32)^{\frac{3}{5}}$

-8

30. $\log_{25} 125$

$\frac{3}{2}$

31. $\ln e^{6}$

6

32. $\log_{27} \frac{1}{3}$

$-\frac{1}{3}$

Find the indicated product, quotient, sum, or difference.

33. $\frac{x^2+4x-12}{x^2+7x+10} \cdot \frac{x+5}{2x-4}$

$\frac{x+6}{2(x+2)}$

34. $\frac{x+2}{3x-3} \div \frac{x^2+11x+18}{x-1}$

$\frac{1}{3(x+9)}$

35. $\frac{8x}{x-5}+\frac{3x}{x+2}$

$\frac{x(11x+1)}{(x-5)(x+2)}$

36. $\frac{1}{x^2+5x+4}-\frac{1}{x^2-16}$

$\frac{5}{(x+1)(x+4)(x-4)}$

Factor the following expressions completely.

37. $m^2-10m+24$

$(m-6)(m-4)$

38. $a^2-3a-40$

$(a-8)(a+5)$

39. $3y^2+5y-12$

$(3y-4)(y+3)$

40. $3r^2+17r+10$

$(3r+2)(r+5)$

41. $25p^2-144$

$(5p-12)(5p+12)$

42. $t^3+12t^2-2t-24$

$(t^2-2)(t+12)$

43. $8x^3-125$

$(2x-5)(4x^2+10x+25)$

44. $-4x^4+22x^2-24$

$-2(x^2+12)(x-1)(x+1)$

Solve the following equations. Give exact answers. Check for extraneous solutions.

45. $9p^2+18p=0$

$p=0 \quad p=-2$

46. $a^2-9a-36=0$

$a=12 \quad a=-3$

47. $2y^2+y-10=0$

$y=-\frac{5}{2} \quad y=2$

48. $8a^2-72=0$

$a=\pm 3$

49. $x^3+2x^2-25x-50=0$

$x=-2 \quad x=\pm 5$

50. $x^4+45=14x^2$

$x=\pm 3 \quad x=\pm\sqrt{5}$

51. $\sqrt{5x+4}-12=-6$

$x=\frac{32}{5}$

52. $x=\sqrt{2x+24}$

$x=6$

53. $x+2=\sqrt{2x+7}$

$x=1$

54. $\sqrt{x+8}=\sqrt{x}+\sqrt{3}$

$x=\frac{25}{12}$

55. $|4x-5|-3=6$

$x=\frac{7}{2} \quad x=-1$

56. $|x+5|+4=2$

$\varnothing$

57. $|x-5|=2x-4$

$x=3$

58. $\frac{8}{x-4}=\frac{2}{x-2}$

$x=\frac{4}{3}$

59. $\frac{7}{x-2}-\frac{4}{x+2}=\frac{3}{x^2-4}$

$x=-\frac{19}{3}$

60. $(x+4)^3+20=-13$

$x=-4+\sqrt[3]{-33}$

61. $2(x-4)^4-16=22$

$x=4\pm\sqrt[4]{19}$

62. $2(x-1)^{\frac{1}{2}}-3=7$

$x=26$

63. $(3x+12)^{\frac{3}{2}}-3=24$

$x=-1$

64. $2(4)^{x+2}-5=7$

$x=\frac{\log 6}{\log 4}-2$

65. $3e^{3-x}=15$

$x=3-\ln 5$

66. $\log_3(x-3)+3=5$

$x=12$

67. $\log_3 x+\log_3(x+8)=2$

$x=1$

Find all the exact roots of the following polynomials:

68. $f(x)=3x^4+14x^3+14x^2-8x-8$

$x=-2 \quad x=-\frac{2}{3} \quad x=-1\pm\sqrt{3}$

69. $f(x)=x^5-x^4-7x^3+11x^2+16x-20$

$x=-2 \quad x=-2 \quad x=1 \quad x=2\pm i$

70. $f(x)=3x^5-2x^4+6x^3-4x^2-24x+16$

$x=\frac{2}{3} \quad x=\pm\sqrt{2} \quad x=\pm 2i$

Solve the following system using any method you choose. Show what method you used.

71.

$2x-5y=3$

$10y=4x-6$

$\left(\frac{5}{2}y+\frac{3}{2},y\right)$

72.

$4x+3y=4$

$-2x-3y=10$

$(7,-8)$

73.

$x+2y-z=4$

$y=3x+4z+2$

$5y+z=10-6x$

$(-z,z+2,z)$

74.

$w+x+2y+z=2$

$2w+2x+y+3z=0$

$2w-4x-2y-z=7$

$-w+2x+y-z=-2$

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

Solve the following inequality algebraically. Graph the solution a number line. Write the solution in interval notation. Round to the nearest hundredth if necessary.

75. $|3x+4|<6$

$\left(-\frac{10}{3},\frac{2}{3}\right)$

76. $|3x-7|+8\le 5$

$\varnothing$

77. $2|x-7|>-8$

$(-\infty,\infty)$

78. $|x+2|-6\ge 5$

$(-\infty,-13]\cup[9,\infty)$

79. $x^2-5x-14>0$

$(-\infty,-2)\cup(7,\infty)$

80. $x^2-3x<-5$

$\varnothing$

81. $2x^2+44\ge 0$

$(-\infty,\infty)$

82. $3x^2+6x+33\le -17x+3$

$[-10,-1]$

83. $-3x^3+10x^2\le -8x$

$\left[-\frac{2}{3},0\right]\cup[4,\infty)$

84. $x^3-3x^2-x+3<0$

$(-\infty,-1)\cup(1,3)$

85. $\sqrt{2x-3}-15\le -8$

$\left[\frac{3}{2},26\right]$

86. $x<\sqrt{2x+15}$

$\left(-\frac{15}{2},5\right)$

87. $x+2\geq\sqrt{2x+7}$

$[1,\infty)$

88. $7^{3x-4}-3\geq 15$

$[1.83,\infty]$

89. $\ln(x+3)-5<-2$

$(-3,17.09)$

Find the inverse of the following functions. State the domain and range of each inverse.

90. $f(x)=2x^3+4$

$f^{-1}(x)=\sqrt[3]{\frac{x-4}{2}}\quad D:(-\infty,\infty)\ R:(-\infty,\infty)$

91. $g(x)=\sqrt{x-2}-4$

$g^{-1}(x)=(x+4)^2+2\quad D:[-4,\infty)\ R:[2,\infty)$

92. $f(x)=e^{x+2}+5$

$f^{-1}(x)=\ln(x-5)-2\quad D:[5,\infty)\ R:(-\infty,\infty)$

93. $f(x)=\log_6(x+2)-9$

$f^{-1}(x)=6^{x+9}-2\quad D:(-\infty,\infty)\ R:[-2,\infty)$

Expand the following into multiple logs:

94. $\log_4\left(\frac{x^4\sqrt[3]{y}}{3z^2}\right)$

$4\log_4 x+\frac{1}{3}\log_4 y-\log_4 3-2\log_4 z$

Condense the following into one log:

95. $\frac{1}{3}\log_5 w-5\log_5 x+\frac{2}{3}\log_5 y-2\log_5 z$

$\log_5\left(\frac{\sqrt[3]{wy^2}}{x^5z^2}\right)$

Evaluate the piecewise functions for the following values.

96. $f(x)=\begin{cases}2x^2-1 & \text{if } x<-2\\ \frac{3x}{x-6} & \text{if } -2\leq x\leq 4\\ 3+2x & \text{if } x>4\end{cases}$

a. $f(2)=-\frac{3}{2}$

b. $f(-2)=1$

c. $f(4)=-6$

d. $f(6)=15$

Write the function as a piecewise function.

97. $f(x)=2|x+5|+4$

$f(x)=\begin{cases}-2x-6 & (-\infty,-5)\\ 2x+14 & [-5,\infty)\end{cases}$

98. $f(x)=-3|x-4|+5$

$f(x)=\begin{cases}3x-7 & (-\infty,4)\\ -3x+17 & [4,\infty)\end{cases}$

Graph the following piecewise functions.

99. $f(x)=\begin{cases}-2x-3 & \text{if } x<0\\ 3x-3 & \text{if } x\geq 0\end{cases}$

Will address in class

100. $f(x)=\begin{cases}x+4 & \text{if } x<-2\\ x^2 & \text{if } x>-2\end{cases}$

Will address in class

Understand how to graph the following parent functions using transformations, be able to identify domain and range using interval notation, identify any asymptotes, and describe end behavior.

<u>Parent Functions</u>

$f(x)=x$

$f(x)=|x|$

$f(x)=x^2$

$f(x)=x^3$

$f(x)=\sqrt{x}$

$f(x)=\frac{1}{x}$

$f(x)=\sqrt[3]{x}$

$f(x)=b^x$

$f(x)=\log_b x$

$f(x)=[x]$

$f(x)=e^x$

$f(x)=\ln x$