Name________________________________ Class ____________ Date____________

Extra Practice

Lesson 6-6

Let $f(x) = 3x^2$ and $g(x) = 2 - 5x$. Perform each function operation.

50. $f(x) - g(x) = 3x^2 - 2 + 5x$ D: ARN

51. $f(x) \cdot g(x) = 6x^2 - 15x^3$ D: ARN

52. $\frac{f(x)}{g(x)} = \frac{3x^2}{2-5x}$, $x \neq \frac{2}{5}$

53. $(f + g)(x)$ $3x^2 + 2 - 5x$ D: ARN

54. $(f \cdot g)(x) = 6x^2 - 15x^3$ D: ARN

55. $\frac{g}{f}(x) = \frac{2-5x}{3x^2}$, $x \neq 0$

Let $f(x) = x^2$ and $g(x) = 3x + 1$. Evaluate each expression.

56. $(f \circ g)(0) = 1$

57. $(f \circ g)(2) = 49$

58. $(f \circ g)(23) = 4900$

59. $(f \circ g)(5) = 256$

60. $(g \circ f)(0) = 1$

61. $(g \circ f)(1) = 4$

62. $(g \circ f)(-1) = 4$

63. $(f \circ f)(3) = 81$

64. $(g \circ g)(4) = 40$

65. Halina works in a department store. Three times per year she is allowed to combine her employee discount with special sale prices. Let x be the retail price of a blouse.

a. Halina's employee discount is 20%. Write a function $E(x)$ that represents the cost of the blouse after the discount. $E(x) = 0.8x$

b. Due to a manufacturer's incentive, the blouse is marked down 25%. Write a function $M(x)$ that represents the sale price. $M(x) = 0.75x$

c. The sales tax on clothing is 6%. Write a function $T(x)$ that describes the cost of a clothing item with sales tax included. $T(x) = 1.06x$

d. Halina found a blouse to which the discounts apply. Use the function composition $f = T \circ E \circ M$ to write the function $f(x)$ that represents the price Halina will pay for the blouse.

$T(E(M(x))) =$
$T(E(0.75x)) =$
$T(0.8(0.75x)) =$
$T(0.6x) =$
$1.06(0.6x) =$
$\boxed{0.636x}$

66. You invest p dollars in an account that earns a simple interest of 6%. The function that represents the account balance at the end of the year is $f(p) = 1.06p$.

a. Suppose that at the end of the year you deposit \$500 in the account. Write a new function $g(p)$ that shows the balance that will earn interest in the second year. $g(p) = p + 500$

b. At the end of every year you add \$500 to the account. The interest rate remains 6%. Write a composition of functions f and g to find the account balance at the end of the third year, before adding the \$500. Find that balance for an initial investment of \$1000.

$f(g(f(g(f(p))))) =$
$f = 1.06\{1.06[1.06(p) + 500] + 500$
$= 1.19196p + 1091.8$
$f(1000) = \$2282.8$

Lesson 6-7

For each function f, find f^{-1} and the domain and range of f and f^{-1}. Determine whether f^{-1} is a function.

67. $f(x) = 6x + 1$ D: ARN R: ARN function
$f^{-1}(x) = \frac{x-1}{6}$ D: ARN R: ARN ~~yes~~

68. $f(x) = \sqrt{x+4}$ D: $x \geq -4$ R: $y \geq 0$ function
$f^{-1}(x) = x^2 - 4$ D: $x \geq 0$ R: $y \geq -4$

69. $f(x) = \sqrt{x-3}$ D: $x \geq 3$ R: $y \geq 0$ functio
$f^{-1}(x) = x^2 + 3$ D: $x \geq 0$ R: $y \geq 3$

$-5x+2\geq y$
$-5x\geq 0$

D: $x \geq \frac{2}{5}$ R: $y\geq 0$ D: ARN R: $y \geq 1$ D: ARN R: $y \leq 2$

70. $f(x)=\sqrt{-5x+2}$ function **71.** $f(x) = 3x^2 + 1$ not a function **72.** $f(x) = 2 - x^2$

$f^{-1}(x)=\frac{x^2-2}{-5}$ $f^{-1}(x)=\pm\sqrt{\frac{x-1}{3}}$ $f^{-1}(x)=\pm\sqrt{-x+2}$ not a function

D: $x\geq 0$ R: $y \geq \frac{2}{5}$ D: $x\geq 1$ R: ARN D: $x \leq 2$, R: ARN

73. You can use the function $f(x) = 331.4 + 0.6x$ to approximate the speed of sound in dry air, where x is the temperature in degrees Celsius.

a. Write an algebraic expression for the inverse function $f^{-1}(x)$.

$f^{-1}(x) = \frac{x-331.4}{0.6}$ or $f^{-1}(x)=\frac{5}{3}x-\frac{1657}{3}$ or $f^{-1}(x)=\frac{10x-3314}{6}$ or $f^{-1}(x)=\frac{5x-1657}{3}$

b. Evaluate $f^{-1}(x)$ for $x = 350$. Round the result to the nearest whole number. Explain what your result represents.

$x=350$

$f^{-1}(350)=\frac{350-331.4}{0.6}$

$=31$

When the speed of sound is 350, the temperature is 31°C.

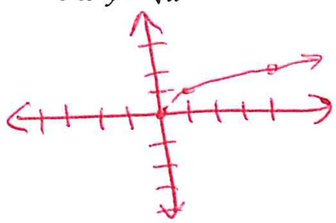
Lesson 6-8

Graph each function.

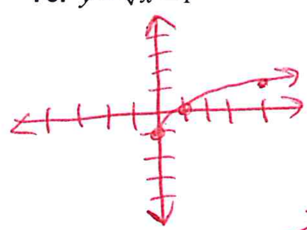
start with (h,k)

74. $y=\sqrt{x}$

x	y
0	0
1	1
4	2

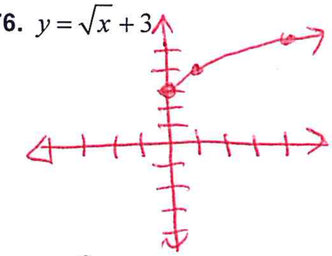


75. $y=\sqrt{x}-1$



x	y
0	-1
1	0
4	1

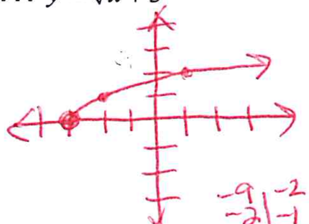
76. $y=\sqrt{x}+3$



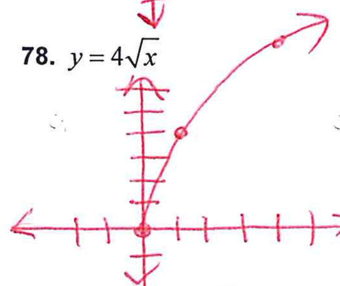
x	y
0	3
1	4
4	5

77. $y=\sqrt{x+3}$

	x	y
	-3	0
+1	-2	1
+4	1	2

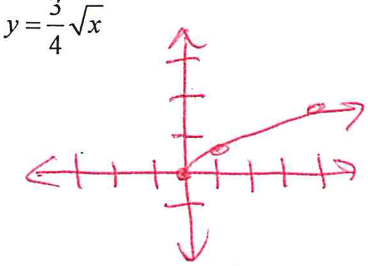


78. $y=4\sqrt{x}$



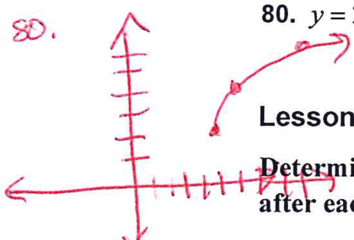
x	y
0	0
1	4
4	8

79. $y=\frac{3}{4}\sqrt{x}$



x	y
0	0
1	$\frac{3}{4}$
4	$\frac{3}{2}$

80.

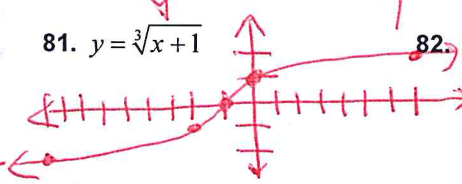


80. $y=2\sqrt{x-5}+2$

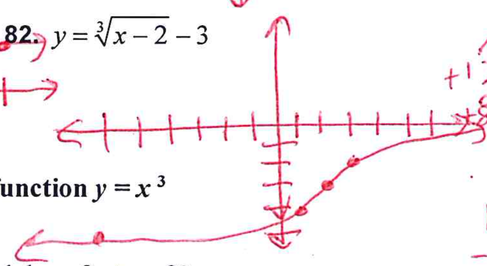
x	y
5	2
6	4
9	6

81. $y=\sqrt[3]{x+1}$

x	y
-9	-2
-2	-1
-1	0
0	1
7	2



82. $y=\sqrt[3]{x-2}-3$



x	y
2	-3
3	-2
1	-4
10	-1
-6	-5

Lesson 5-9

Determine the cubic function that is obtained from the parent function $y = x^3$ after each sequence of transformations.

84. vertical stretch by a factor of 2;
reflection across the x-axis;
horizontal translation 3 units left

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

85. vertical stretch by a factor of 3;
vertical translation down 2 units;
horizontal translation 1 unit right

$y=3(x-1)^3-2$

Find all the real zeros of each function.

86. $y=2(x-3)^3+2$

$0=2(x-3)^3+2$
$2=2(x-3)^3$ $1=x-3$
$1=(x-3)^3$ $\boxed{4=x}$

87. $6(x+3)^3-6=0$

$6(x+3)^3=6$
$(x+3)^3=1$
$x+3=1$ $\boxed{x=-2}$

88. $-\frac{1}{3}\left(x+\frac{1}{2}\right)^3-5=0$

$-3\left[-\frac{1}{3}(x+\frac{1}{2})^3\right]=5\cdot -3$

$(x+\frac{1}{2})^3=-15$

$x+\frac{1}{2}=\sqrt[3]{-15}$
$-\frac{1}{2}$ $-\frac{1}{2}$

$\boxed{x=-\sqrt[3]{15}-\frac{1}{2}}$

Find a quartic function with the given x-values as its only real zeros.

89. $x = -3$ and $x = 3$ **90.** $x = 1$ and $x = 3$ **91.** $x = 0$ and $x = 4$

$f=(x+3)(x-3)(x^2+1)=x^4-8x^2-9$ $f(x)=x^4-4x^3+4x^2-4x+3$ $f(x)=x^4-4x^3+x^2-4x$

92. $x = -8$ and $x = -6$ **93.** $x = -2$ and $x = 8$ **94.** $x = -3$ and $x = 5$

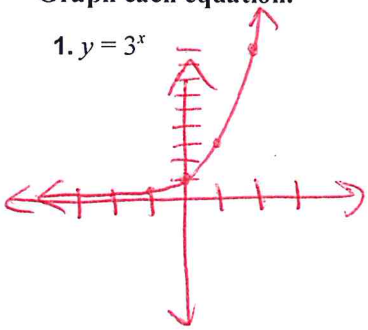
$f(x)=x^4-14x^3+49x^2-14x+48$ $f(x)=x^4+6x^3-15x^2+6x-16$ $f(x)=x^4+2x^3-14x^2+2x+15$

Lesson 7-1

Graph each equation.

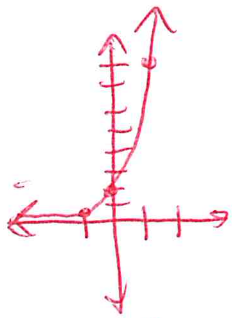
1. $y = 3^x$

x	y
0	1
1	3
2	9
-1	$\frac{1}{3}$
-2	$\frac{1}{9}$



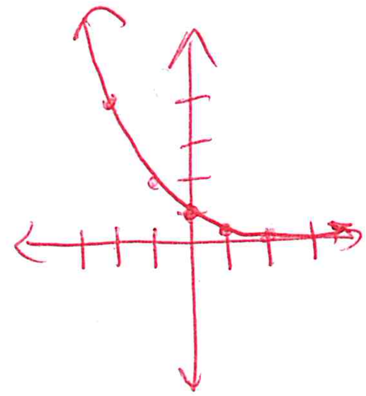
2. $y = 2(4)^x$

x	y
0	2
1	8
-1	$2 \cdot \frac{1}{4} = \frac{1}{2}$



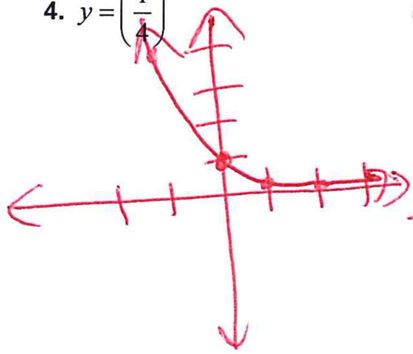
3. $y = 2^{-x}$

x	y
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$
-1	2
-2	4



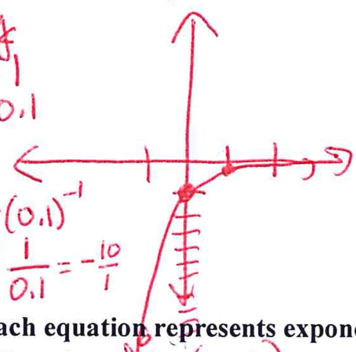
4. $y = \left(\frac{1}{4}\right)^x$

x	y
0	1
1	$\frac{1}{4}$
2	$\frac{1}{16}$
-1	4
-2	16



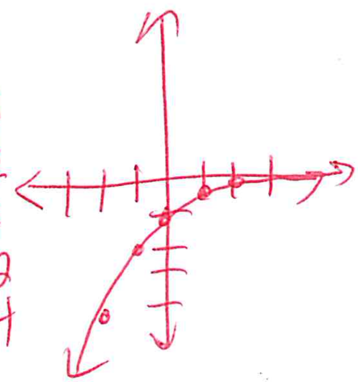
5. $y = -0.1^x = -(0.1)^x$

x	y
0	-1
1	-0.1
-1	$-(0.1)^{-1}$, $-\frac{1}{0.1} = -\frac{10}{1}$



6. $y = -\left(\frac{1}{2}\right)^x$

x	y
0	-1
1	$-\frac{1}{2}$
2	$-\frac{1}{4}$
-1	-2
-2	-4



Without graphing, determine whether each equation represents exponential growth or exponential decay. Then find the y-intercept. $(x=0)$

7. $y = 10^x$ G, 1

8. $y = 327(0.05)^x$ D, 327

9. $y = 1.023(0.98)^x$ D, 1.023

10. $y = 0.5(1.67)^x$ G, 0.5

11. $y = 1.14^x$ G, 1

12. $y = 8(1.3)^x$ G, 8

13. $y = 2\left(\frac{9}{10}\right)^x$ D, 2

14. $y = 4.1(0.72)^x$ D, 4.1

15. $y = 9.2(2.3)^x$ G, 9.2

16. Mr. Andersen put $1000 into an account that earns 4.5% annual interest. The interest is compounded annually and there are no withdrawals. How much money will be in the account at the end of 30 years?

$y = ab^x$

$y = 1000(1.045)^{30}$

$y = \$3{,}745.32$

17. A manufacturer bought a new rolling press for $48,000. It has depreciated in value at an annual rate of 15%. What is its value 5 years after purchase? Round to the nearest hundred dollars.

$y = ab^x$ $\quad b = 1 - 0.15 = 0.85$

$y = 48000(0.85)^5$

$y \approx \$21{,}300$