Name: Key

Practice Test #4 – Ch. 10 & Beginning Ch. 11
Intermediate Algebra – M120

Instructions: *On the actual exam, all work must be shown in order to receive all points for all questions so practice showing all work. Practice* ***boxing your final answer****. Any answer that is a fraction must be in lowest terms and as mixed number for full credit. Since you can use a 5x8 notecard on the test use your notecard to practice or make one based on the problems you got wrong. Happy studying!*

1. **Graph** the functions on the graph provided. Label 3 points on each with ordered pairs.

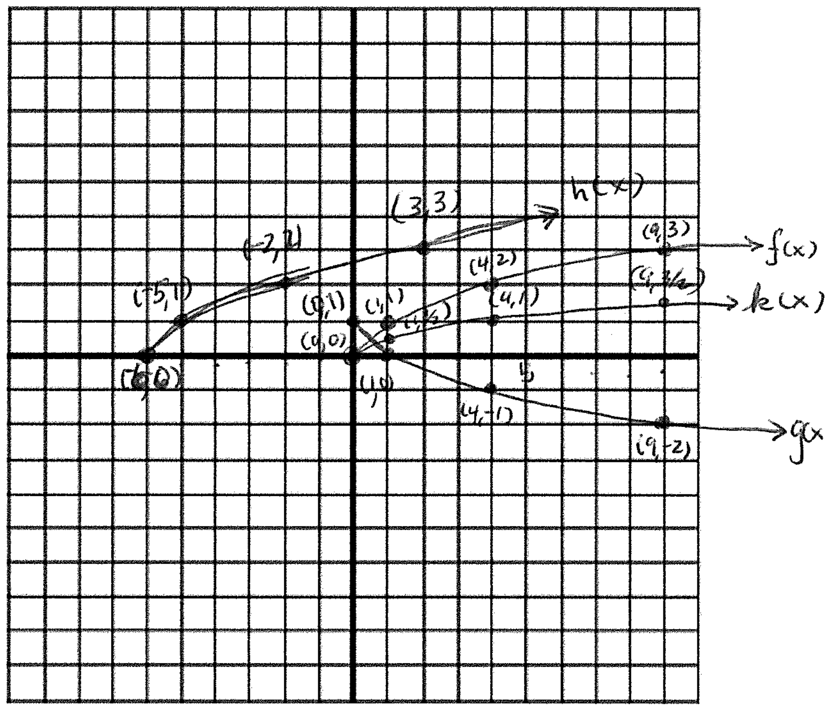
a) $f(x) = \sqrt{x}$

b) $g(x) = 1 - \sqrt{x}$

c) $h(x) = \sqrt{x + 6}$

d) $k(x) = \frac{1}{2}\sqrt{x}$

h(x) x	x	f(x)	g(x)	k(x)
-6	0	0	1	0
-5	1	1	0	½
-2	4	2	-1	1
3	9	3	-2	3/2



2. Simplify. Don't approximate.

$\sqrt{432}$

432 → 4, 108; 108 → 9, 12; 12 → 4, 3

$\sqrt{16 \cdot 9 \cdot 3} = 4 \cdot 3\sqrt{3} = \boxed{12\sqrt{3}}$

or $(2^4 \cdot 3^3)^{1/2} = 2^2 \cdot 3 \cdot 3^{1/2} = 12\sqrt{3}$

3. Simplify. Use only positive exponents.

a) $-2(xy^2)^0$

$= -2 \cdot 1 = \boxed{-2}$

b) $\dfrac{(2x-5)^2}{(2x-5)^7} = \boxed{\dfrac{1}{(2x-5)^5}}$

c) $-4(2x^2y)^5(-3x^3y^5)$

$= -4 \cdot \underbrace{2^5}_{32} \cdot x^{10} \cdot y^5 \cdot -3 \cdot x^3 \cdot y^5$

$= 12 \cdot 32 \cdot x^{13}y^{10}$

32 × 12 = 64 + 320 = 384

$= \boxed{384x^{13}y^{10}}$

d) $\dfrac{2x^{-5}}{5y^{-3}} = \boxed{\dfrac{2y^3}{5x^5}}$

e) $(x^2y^3)^2(x^2y^3)^3$

$= x^4y^6 \cdot x^6y^9$

$= \boxed{x^{10}y^{15}}$

4. Solve. $(\sqrt{21+x}) = (3+\sqrt{x})^2$

$$21 + x = 9 + 6\sqrt{x} + x$$
$$-9 \quad -x \qquad -9 \qquad\qquad -x$$
$$\frac{12}{6} = \frac{6\sqrt{x}}{6}$$
$$(2)^2 = (\sqrt{x})^2$$
$$\boxed{4 = x}$$

$\sqrt{21+4} \stackrel{?}{=} 3 + \sqrt{4}$

$\sqrt{25} \stackrel{?}{=} 3 + 2$

$5 = 5$ ✓

5. Solve. $(\sqrt{2x-3}) = (x-3)^2$

$$2x - 3 = x^2 - 6x + 9$$
$$-2x + 3 \qquad\quad -2x \quad + 3$$
$$0 = x^2 - 8x + 12$$
$$(x-6)(x-2) = 0$$

$x - 6 = 0$; $+6 \;\; +6$; $\boxed{x = 6}$

$x - 2 = 0$; $+2 \;\; +2$; $\cancel{x = 2}$

$\sqrt{2(6)-3} \stackrel{?}{=} 6-3$ or $\sqrt{2(2)-3} \stackrel{?}{=} 2-3$

$\sqrt{12-3} = 3$ $\qquad \sqrt{4-3} \neq -1$

$\sqrt{9} = 3$ $\qquad 1 \neq -1$

$3 = 3$ ✓

6. Simplify. Answer in radical form as a final solution.

a) $(289)^{-1/2} = \dfrac{1}{\sqrt{289}} = \boxed{\pm\dfrac{1}{17}}$

b) $(32)^{3/4} = \left(\pm\sqrt[4]{2^4}\right)^3 = (\pm 2)^3 = \boxed{\pm 8}$

7. Simplify. Do not approximate. Return any rational exponent to radicals.

a) $\sqrt[3]{-48x^{16}y^9}$

$4 \;\; 12 \;\; 4 \;\; 3$

$= -\sqrt[3]{2^4 \cdot 3x^{16}y^9}$

$= \boxed{-2x^5y^3\sqrt[3]{6x}}$

b) $\sqrt[4]{x^6} \bullet \sqrt[3]{x^8}$

$= x^{6/4} \cdot x^{8/3} = x^{3/2 + 8/3}$

$= x^{\frac{9}{6} + \frac{16}{6}} = x^{\frac{25}{6}} = \boxed{x^4\sqrt[6]{x}}$

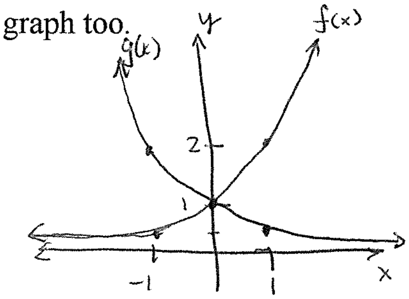
c) $\dfrac{\sqrt[3]{x^4}}{\sqrt{x}} = x^{4/3 - 1/2}$

$= x^{\frac{8}{6} - \frac{3}{6}} = x^{5/6} = \boxed{\sqrt[6]{x^5}}$

8. Complete the table of values for the function that follows as a translation (represented by x′ or y′) of the function $f(x) = 2^x$. Be able to graph too.

$g(x) = (^1/_2)^x = 2^{-x}$

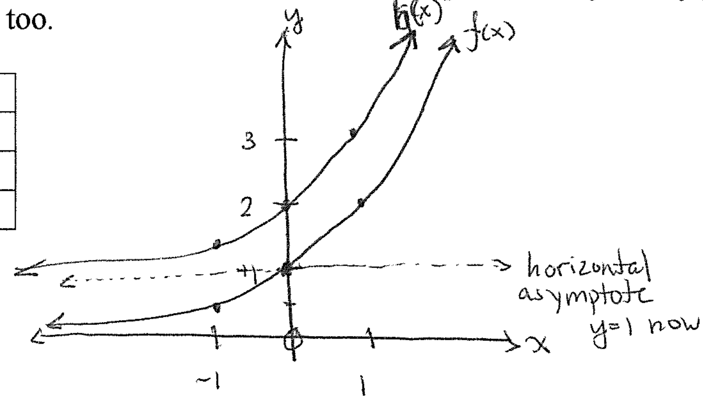
x′	x	y = f(x) = 2ˣ
1	-1	$^1/_2$
0	0	1
-1	1	2



9. Complete the table of values for the function that follows as a translation (represented by x′ or y′) of the function $f(x) = 2^x$. Be able to graph too.

$h(x) = 1 + (2)^x$

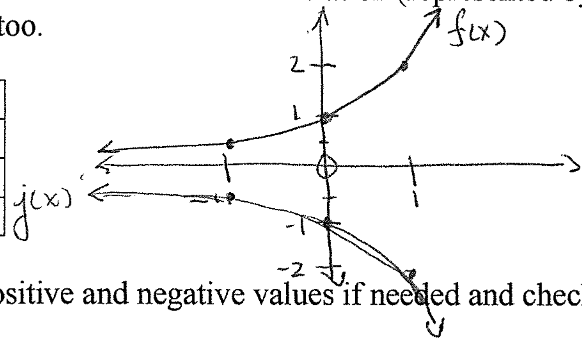
x	y = f(x) = 2ˣ	y′ = h(x) = 1+ (2)ˣ
-1	$^1/_2$	$1 + ½ = 3/2$
0	1	$1 + 1 = 2$
1	2	$1 + 2 = 3$



10. Complete the table of values for the function that follows as a translation (represented by x′ or y′) of the function $f(x) = 2^x$. Be able to graph too.

$j(x) = -2^x$

x	$y = f(x) = 2^x$	$y' = j(x) = -2^x$
-1	$1/2$	$-\frac{1}{2}$
0	1	-1
1	2	-2



11. Solve the exponential function. Do give positive and negative values if needed and check solutions.

$$\frac{4b^4}{4} = \frac{128}{4}$$

$$\sqrt[4]{b^4} = \sqrt[4]{32}$$

$$\boxed{b = \pm 2\sqrt{2} \approx \pm 4.8}$$

$$\begin{array}{r} 2.414 \\ \times \quad 2 \\ \hline 4.828 \end{array}$$

12. Solve the exponential function. Do give positive and negative values if needed and check solutions.

$$\frac{b^9}{b^6} = 504$$

$$\sqrt[3]{b^3} = \sqrt[3]{504}$$

$$\boxed{b = 2\sqrt[3]{63} \approx 7.958}$$

504
4 126
2 63
9 7

13. Find an exponential model for the following points. (0, 4) & (3, 12)

$f(x) = 4b^x$ so $\boxed{f(x) = 4(1.442)^x}$

so

$$\frac{12}{4} = \frac{4(b)^3}{4} \Rightarrow 3 = b^3 \Rightarrow b = \sqrt[3]{3} \approx 1.442$$

14. Find an exponential model for the following points. (4, 10) & (6, 46)

$$\boxed{f(t) = 0.244(2.530)^t} \quad \frac{b^6}{b^4} = \frac{64}{10} \Rightarrow \sqrt{b^2} = \sqrt{6.4} \doteq 2.530 \Rightarrow f(t) = a(2.530)^t \Rightarrow 10 = a(2.530)^4$$

$$a = \frac{10}{2.530^4} \doteq 0.244$$

15. Find the inverse algebraically: $f(x) = \frac{1}{2}(x + 5) - 6$

$$y = \frac{1}{2}x + \frac{5}{2} - \frac{12}{2}$$

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

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

$$2x = y - 7$$

$$+7 \quad +7$$

$$2x + 7 = y$$

$$\boxed{f^{-1}(x) = 2x + 7}$$

16. For the inverse function given, find f(5)

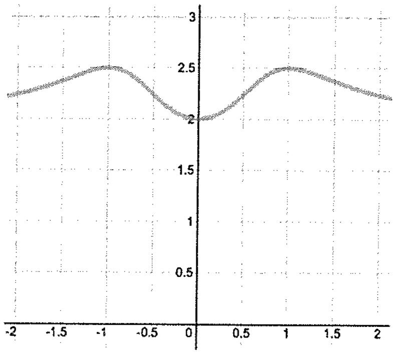
x	$f^{-1}(x)$
2	3
3	4
4	5
5	6

y x

$$\boxed{f(5) = 4}$$

since in an inverse the x's are the y's and y's are the x's

17. Is the following a function? Is it 1:1? Explain.



This represents a function because it passes a vertical line test but it is not 1:1 b/c it doesn't pass a horizontal line test.

18. Three functions are given in the table below. Find a possible equation for the set of ordered pairs that represents an exponential function – do not find any other equations. Clearly label the exponential model you create with the appropriate function name.

x	*g(x)*	*h(x)*	*k(x)*
0	11	11	5
1	5	13	25
2	vertex 3	15	125
3	5	17	625
4	11	19	3125
	quadratic	linear	exponential

$g(x)$: $-6, -2, 2, 6$; $+4, +4, +4$

$h(x)$: $2, 2, 2, 2$

$k(x)$: $25/5 = 5$, $125/25 = 5$, $625/125 = 5$, $3125/625 = 5$

$$\boxed{k(x) = 5(5)^x}$$

19. The half-life of a radioactive element is 5 years. There are 12 grams of this element present at the beginning. Write an exponential function representing the number of grams that will be present *t* years from the beginning. ***Hint***: Keep in mind that in 5 years there will be 6 grams present.

$f(t) = 12b^t$

$6 = 12b^5$

$\frac{1}{2} = b^5$

$b = \sqrt[5]{1/2} \approx 0.871$

$\Rightarrow \boxed{f(t) = 12(0.871)^t}$

20. Change to standard form.

a) 1.45×10^3

$= \boxed{1{,}450}$

b) 5.4792×10^{-2}

$= \boxed{0.054792}$

21. Change to scientific notation. Make sure the answer is in the "correct form".

a) 104,050,001

$= \boxed{1.04050001 \times 10^8}$

b) 0.00007200

$= \boxed{7.2 \times 10^{-5}}$

c) 0.025×10^{-7}

$= 2.5 \times 10^{-2} \times 10^{-7}$

$= \boxed{2.5 \times 10^{-9}}$

d) 205.1×10^2

$= 2.051 \times 10^2 \times 10^2$

$= \boxed{2.051 \times 10^4}$

22. Multiply or divide using scientific notation. Do not use standard form to multiply or divide. Show work using exponent rules. Make sure your final answer is in "correct" scientific notation.

a) $(1.2 \times 10^{-3})(12 \times 10^5)$ $+-3$

$= 144 \times 10^2$

$= 1.44 \times 10^1 \times 10^2 = \boxed{1.44 \times 10^3}$

b) $\dfrac{(9 \times 10^{5-3})}{(3 \times 10^2)} = \boxed{3 \times 10^3}$

23. Find g(f(x)) when $f(x) = x + 2$ $g(x) = 2x^2 - 8x + 9$

$g(f(x)) = 2(x+2)^2 - 8(x+2) + 9$

$= 2(x^2 + 4x + 4) - 8x - 16 + 9$

$= 2x^2 \cancel{+8x} + 8 \cancel{-8x} - 16 + 9$

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

24. Find the inverse {(-1, 5), (5, 7), (12, 11), (24, 15)}

{(5, -1), (7, 5), (11, 12), (15, 24)}

25. Draw the inverse for the function shown.