Name: Key

Practice Test #1
Intermediate Algebra – M120

Instructions: *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. Using **roster form**, give the answers to the following based upon sets A & B

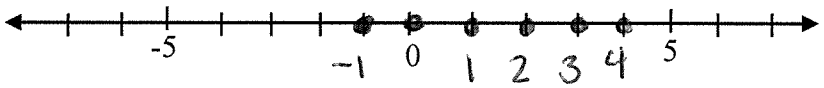
$A = \{0, 1, 2, 3, 4, 5, 6\}$ $B = \{-3, -2, -1, 0, 1, 2, 3\}$

a) $A \cup B$ $\{-3, -2, -1, 0, 1, 2, 3, 4, 5, 6\}$

b) $A \cap B$ $\{0, 1, 2, 3\}$

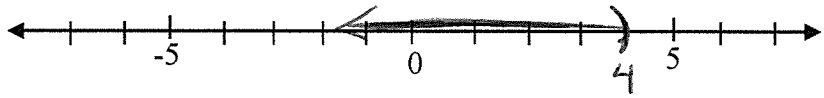
2. **Graph** the following and show what you have graphed in **roster form** too. Study the sets of numbers shorthand on the study guide.

$\{x \mid x \in W, -1 \leq x < 5\}$



3. Could 2's answer be given in interval notation? YES (NO)
Justify your answer. It's not $\mathbb{R}$ which is what interval assumes.

4. **Graph** the following. $\{x \mid x \leq 4\}$



5. Could 4's answer be given in a roster form? YES (NO)
Justify your answer. It's real numbers which can't be given as a list or patterned list.

6. Give the following in **interval notation** $\{x \mid 5 \leq x < 92\}$

$[5, 92)$

7. Solve & graph the following on a number line:

$-2 \leq 1 - 3x < 16$

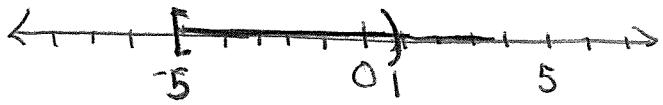
$-1 \quad -1 \quad -1$

$-3 \leq -3x < 15$

$\frac{-3}{-3} \quad \frac{-3x}{-3} \quad \frac{15}{-3}$

$1 \geq x > -5$

$-5 < x \leq 1$



8. Solve & give **interval notation** for the following: $3(2x + 1) - 7x > 1 + 5(2x - 4)$

$6x + 3 \qquad 10x - 20$

$(-\infty, 2)$

$-x + 3 > -19 + 10x$

$+x \qquad +x$

$3 > -19 + 11x \Rightarrow 11x < 22$

$+19 \quad +19$

$x < 2$

9. Find the solution set for the following. Give the solution in roster form or interval notation. If the solution is a null set, use roster form appropriately to indicate that solution. Show all work.

a) $\left|\frac{3x - 2}{2}\right| = 4$ $\{-2, 10/3\}$

$\frac{3x-2}{2} = 4$ or $\frac{3x-2}{2} = -4$

$3x-2 = 8$ $\quad 3x-2 = -8$

$3x = 10$ $\quad 3x = -6$

$x = 10/3$ $\quad x = -2$

b) $|3x| - 5 > 19$

$+5 \quad +5$

$|3x| > 24$

$(-\infty, -8) \cup (8, \infty)$

$3x < -24$ or $3x > 24$

$x < -8$ $\quad x > 8$

c) $|2x - 3| \leq 7$

$-7 \leq 2x - 3 \leq 7$

$+3 \quad +3 \quad +3$

$-4 \leq 2x \leq 10$

$\frac{-4}{2} \leq \frac{2x}{2} \leq \frac{10}{2}$

$-2 \leq x \leq 5$

$[-2, 5]$

d) $|x - 2| + 8 < 8$

$-8 \quad -8$

$|x-2| < 0$

$|x-2|$ is positive & can't be < 0

$\phi \Rightarrow \{\}$

e) $\left|\frac{x - 9}{7}\right| > 0$

Always greater but not zero

so all reals except

$\frac{x-9}{7} = 0 \Rightarrow x - 9 = 0 \Rightarrow x = 9$

$\{x \mid x \neq 9\}$ or as interval $(-\infty, 9) \cup (9, \infty)$

10. Factor all of the following problems **completely**.

a) $12x^5 - 15x^4 + 9x^3 + 15x^2$

$= 3x^2(4x^3 - 5x^2 + 3x + 5)$

b) $x^3 - 3x^2 + 7x - 21$

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

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

c) $x^2 - xy + 20y^2$ $\quad 1\cdot 20$ $\quad 2\cdot 10$ $\quad 4\cdot 5$ but none sum to 1.

$=$ prime ★ What would make it factor? ★

d) $-5x^3 + 5x^2 + 30x$ $\quad 1\cdot 6$ $\quad 2\cdot 3 \leftarrow$ differ by 1

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

$= -5x(x - 3)(x + 2)$

e) $343x^3 + 8y^3$ $\quad 7x \quad 2y$ sum of cubes

$= (7x + 2y)(49x^2 - 14xy + 4y^2)$

f) $4x^2 - 40xy + 25y^2$ $\quad 2x \quad 5y$

prime

$2\cdot 2\cdot 5 = 20xy$ ★ This would make it factor! so not PST

$25\cdot 4 = 100$ $\quad 1\cdot 100$ $\quad 2\cdot 50$ $\quad 4\cdot 25$ $\quad 5\cdot 20$

None sum to 40

10. con'd

g) $36x^6 - 25y^2$ Difference of Squares
$6x^2 \quad 5y$

$= (6x^2 - 5y)(6x^2 + 5y)$

h) $x^2 - 11x - 18$

What would make it factor? 1, 18 / 2, 9 / 3, 6 None differ by 11

$=$ prime

i) $4x^2 + 16$

$= 4(x^2 + 4)$

Make sure you didn't factor a sum of squares!!

j) $2x^3 + 54$

$= 2(x^3 + 27)$ GCF & sum of cubes

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

11. Solve the following using the zero factor property. If you do not use the zero factor property you will not get credit. Give your answer as a solution set.

$3x^2 - 10x = -7$

$3x^2 - 10x + 7 = 0$

$7 + 3 = 10$

$(3x - 7)(x - 1) = 0$

$3x - 7 = 0$ or $x - 1 = 0$

$+7 \quad +7 \qquad +1 \quad +1$

$3x = 7$ $\qquad x = 1$

$x = 7/3$

$\{7/3, 1\}$

12. Find the x-intercepts of the parabola and list them appropriately: $f(x) = x^2 + 19x + 84$ 12·7

$= (x + 12)(x + 7)$

$x + 12 = 0$ or $x + 7 = 0$

$-12 \quad -12 \qquad -7 \quad -7$

$x = -12 \qquad x = -7$

$(-12, 0)$ or $(-7, 0)$

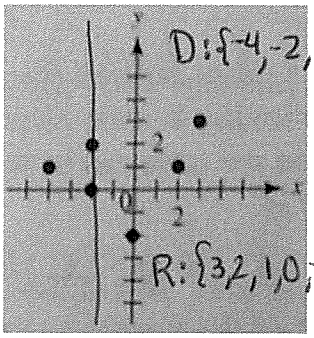
13. a) Determine if each of the following relations are functions and justify your answer.
b) Give the domain and range of the relation **in ii)**.

i) $f(x) = \sqrt{x - 1}$

D: $\{x \mid x \geq 1\}$

This will pass a vertical line test so it is a function

ii)



Fails the vertical line test
∴ not a function

iii)

x	y
-1	4
-2	-3
2	13
1	6

No x's repeat so it is a function

14. Referring to #13 above, answer the questions below. Assume that each of the problems above represent f(x) whether they are actually functions or named as f(x) to begin. Assume whether it is a function, a graph or a table it is named f(x).

a) For i) in #13, find f(5)

$f(5) = \sqrt{5 - 1} = \sqrt{4} = 2$

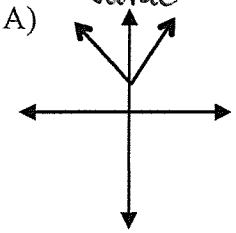
b) For ii) in #13, find f(0)

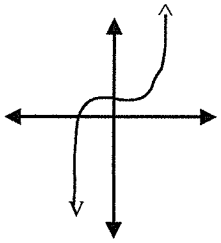
$f(0) = -2$

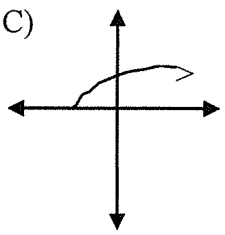
c) For iii) in #13, find f(x) = 6

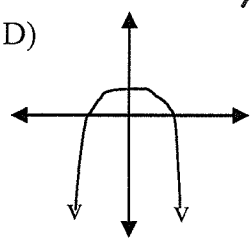
When $y = 6 \Rightarrow x = 1$

15. Match the figures with the equations based upon your knowledge. Write the letter of the matching graph on the line next to the equation that best describes the graph.

A) Absolute Value 

B) Cubic 

C) Square Root 

D) Parabola/Quadratic 

C $f(x) = \sqrt{(x+3)}$ B $f(x) = x^3 + 1$ A $f(x) = |x| + 3$ D $f(x) = -x^2 + 2$

16. What do all the functions in #15 have in common? Hint: The knowledge can help you look at an equation and determine whether it is a function.

They are all non-linear functions.

Note: Knowing how these non-linear functions graph can help us to identify functions base upon their picture or if a formula is a function based upon it's picture.

17. The length of a rectangle is 2 meters less than twice the width. Find the dimensions of the rectangle its area is 84 square meters.

a) Set the problem up using function notation

b) Using your function find the dimensions of the rectangle

length $= 2w - 2 \Rightarrow 2(7) - 2 = 14 - 2 = 12$

width $= w \Rightarrow 7$

$A(w) = (2w-2)(w) = 84\ m^2$

$2w^2 - 2w - 84 = 0$

$2(w^2 - w - 42) = 0$

$2(w-7)(w+6) = 0$

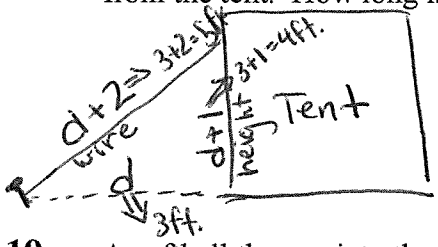
$w - 7 = 0$ or $w + 6 = 0$

$+7\ +7$ $\quad -6\ -6$

$w = 7$ $\quad w = -6$ extraneous b/c negative

Width = 7 meters
Length = 12 meters

18. A tent has wires attached to it to help stabilize it. A wire is attached to the ground some distance from the tent. The length of wire used is 2 feet greater than the distance from the tent, and the height of the tent is 1 foot greater than the distance from the tent. How long is the wire? (Hint: The wire is the hypotenuse of a right triangle.)



$(d+2)^2 = d^2 + (d+1)^2$

$d^2 + 4d + 4 = d^2 + d^2 + 2d + 1$

$-d^2 \quad -4d - 4 \quad -d^2 \quad -4d - 4$

$0 = d^2 - 2d - 3$

$(d-3)(d+1) = 0$

$d - 3 = 0$ $\quad d + 1 = 0$

$+3\ +3$ $\quad -1\ -1$

$d = 3$ $\quad d = -1$ extraneous

The wire is 5 feet

19. A softball thrown into the air travels in a parabola. Its height is a function of the time from which it was thrown and is described by $h(t) = -16t^2 + 64t + 960$. Find the time it takes for the ball to reach the ground.

$h(t) = 0$ when the ball hits the ground.

$-16t^2 + 64t + 960 = 0$

$-16(t^2 - 4t - 60) = 0$

$-16(t-10)(t+6) = 0$

$t - 10 = 0$ or $t + 6 = 0$

$+10\ +10$ $\quad -6\ -6$

$t = 10$ $\quad t = -6$ extraneous

The ball will take 6 seconds to hit the ground.

1.60
2.30
3.20
4.15
5.12
6.10