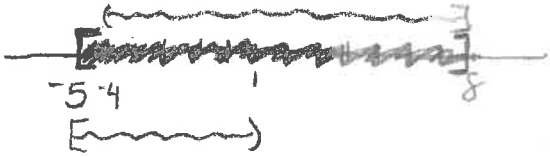
Name: Key
Recitation Instructor, Day, Time:

TRADITIONAL MATH 100 – Exam 1 – Spring 2018

Directions: You will find 15 problems listed below. No notes/books/friends are allowed. Graphing calculator models above the level of a TI-84 plus are not allowed. You have one hour to complete this exam.

Page 1 20 pts.	Page 2 20 pts.	Page 3 20 pts.	Page 4 20 pts.	Page 5 20 pts	TOTAL 100 pts

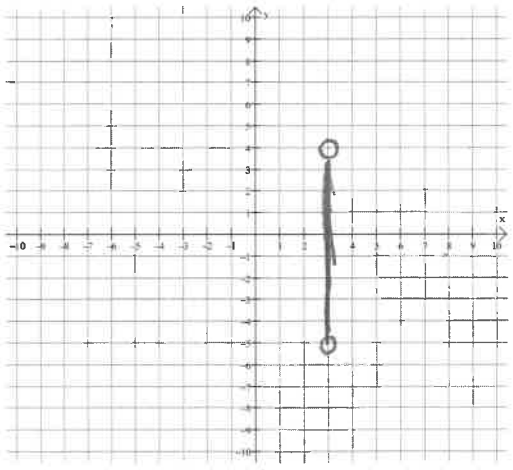
1. (6 points) Find the union. Express answers in **interval notation** and on a **number line**:
$(-4, 8] \cup [-5, 1)$



← number line answer

Interval answer
$[-5, 8]$

2. (7 points) On the grid below, graph the relation $\{(3, y) | -5 < y < 4\}$



3. (7 points) Find the distance between the two points $(1, 4)$ and $(-2, 1)$.

distance $= \sqrt{(4-1)^2 + (1-(-2))^2}$

$= \sqrt{9+9} = \sqrt{18} = \boxed{3\sqrt{2}}$

4. (8 points) Consider $g(x) = 3x^2 - 4dx$, where d is some external parameter. Answer the following:

(a) Find $g(1)$. $g(1) = 3(1)^2 - 4d(1) = 3 - 4d$

(b) Find $g(-2)$. $g(-2) = 3(-2)^2 - 4d(-2) = 12 + 8d$

(c) Find $g(3)$. $g(3) = 3(3)^2 - 4d(3) = 27 - 12d$

(d) Find $g(-4)$. $g(-4) = 3(-4)^2 - 4d(-4) = 48 + 16d$

5. (6 points) Solve for x in the equation $2(4x - 5) - 8 = -3(x + 1) + 7$.

$8x - 10 - 8 = -3x - 3 + 7$

$11x = 22$

$\boxed{x = 2}$

6. (6 points) Is the function $f(x) = x^5 + x$ even, odd, or neither? Use the definitions of even/odd to justify your answers. (Answers that only show a graph will only receive partial credit).

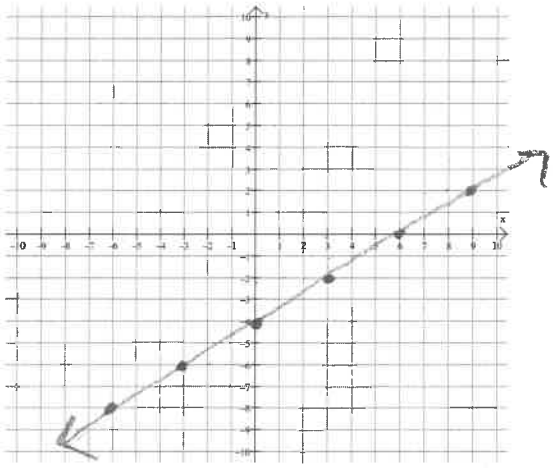
$f(-x) = -x^5 - x$

$-f(x) = -x^5 - x$

Since $f(-x) = -f(x)$, $f(x)$ is odd.

7. (6 points) Graph $y = \frac{2}{3}x - 4$ on the grid below. Include at least 6 points on your graph, including the intercepts.

x	y
9	2
6	0
3	-2
0	-4
-3	-6
-6	-8



8. (8 points) Given $f(x) = 4x + 1$, find the difference quotient $\frac{f(x+h) - f(x)}{h}$.

$$\frac{f(x+h)-f(x)}{h} = \frac{4(x+h)+1-(4x+1)}{h}$$

$$= \frac{4x+4h+1-4x-1}{h} = \frac{4h}{h} = \boxed{4}$$

9. (6 points) Suppose the total cost function for a certain product is given by $C(x) = 6x + 120$ and the revenue function for the product is given by $R(x) = 18x$. Find a formula for the following functions:

(a) Profit Function, $P(x)$

$$P(x) = R(x) - C(x) = 18x - (6x + 120) = 12x - 120$$

(b) Average Cost Function, $\overline{C(x)}$

$$\overline{C(x)} = \frac{C(x)}{x} = \frac{6x+120}{x} = 6 + \frac{120}{x}$$

10. (6 points) Find the domain of the function $f(x) = \dfrac{2}{x-4}$.

All reals except $x = 4$.

11. (6 points) Find the midpoint of the points $(11, -5)$ and $(-8, 2)$.

$$\left(\frac{11+(-8)}{2}, \frac{-5+2}{2}\right)$$

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

12. (8 points) Consider $y^2 = x$. Is y a function of x? Explain in COMPLETE SENTENCES, using terminology learned in class.

No; an input value of $x = 4$, for example, has two different y-values assigned to it, which cannot happen with functions.

Ex] $(4, 2)$
$(4, -2)$

13. (8 points) Given $f(x) = 4x^2 - 1$ and $g(x) = x + 2$, find $(fg)(x)$.

$(fg)(x) = f(x)g(x)$

$= (4x^2 - 1)(x + 2)$

$= 4x^3 + 8x^2 - x - 2$

14. (6 points) Consider the graph of $h(x) = x^2$. Describe how the graph of $h(x + 1) - 7$ would look in terms of translations.

$h(x+1)-7$ would have the shape of $h(x)$, but shifted left 1 unit and downward 7 units

15. (6 points) Graph the function $k(x) = x^2 - 2$, clearly labeling at least 5 points.