Math 1148
Autumn 2017
Midterm 1
Form A

Name: _____

Name.nn: _____

Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

Instructions:

- You have **55 minutes** to complete this exam. It consists of 12 questions on 7 pages including this cover sheet and is worth a total of 100 points. The value of each question is listed below and with each question. Partial credit might not be awarded on some questions.

- You may not use any books or notes during this exam.

- Calculators are permitted EXCEPT those calculators that have symbolic algebra or calculus capabilities. In particular, the following calculators and their upgrades are not permitted: TI-89, TI-92, and HP-49. In addition, neither PDAs, laptops nor cell phones are permitted.

- Make sure to read each question carefully.

- Please **write clearly** and make sure to **justify your answers**. Correct answers with no supporting work may receive no credit. If you find a solution to a problem using a graph from your calculator (where appropriate), you need to sketch that graph and label all relevant information.

- Unless otherwise specified, make sure your answers are in **exact form** (i.e. not decimal approximations).

- Make sure to **circle** your answers.

- A random sample of graded exams will be xeroxed before being returned.

Question:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	Total
Points:	8	6	7	8	8	6	10	8	13	6	10	10	100
Score:													

(1). (8 points) Write an equation for a line which passes through the point $(3, -2)$ and is perpendicular to the line $3x + 7y = 9$. Please write your equation in **slope-intercept** form.

(2). (6 points) Determine if the lines defined by the equations $2x - 5y = 8$ and $-x = \frac{5}{2}y + 4$ are parallel, perpendicular or neither.
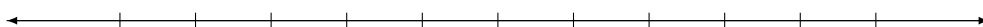
(3). Let $f(x) = \dfrac{x^2 - 16}{x^2 - 2x - 8}$

(**a**) (4 points) Find the x-intercept(s).

(**b**) (3 points) Find the y-intercept(s).

(4). (8 points) Solve the following absolute value inequality: $|3x + 2| - 4 \geq 9$. Write the solution set in **interval notation**.

(5). (8 points) Solve the inequality $\dfrac{z + 3}{4} + \dfrac{2 - z}{2} < \dfrac{z}{3}$. Write the solution set in **interval notation** and graph the solution.

Graph:

(6). Determine if the following are functions of x. Circle the correct answer.

    (a) (2 points) $5x^2 + 3y^2 = 8$　　　　(i). Function of x　　(ii). Not a function of x

    (b) (2 points) $5|x| + 4y = 7$　　　　(i). Function of x　　(ii). Not a function of x

    (c) (2 points) $\sqrt{x} + 5y = 3$　　　　(i). Function of x　　(ii). Not a function of x

(7). Determine the domains of the following functions. Write the domain using **interval notation**:

    (a) (4 points) $f(x) = \dfrac{x^2 + 4x - 7}{x - 5}$　　　　　　　　　Domain: _____

    (b) (4 points) $f(x) = \dfrac{\sqrt{1 - x}}{x + 4}$　　　　　　　　　Domain: _____

    (c) (2 points) $f(x) = \dfrac{x + 4}{\sqrt{1 - x}}$　　　　　　　　　Domain: _____

(8). (8 points) Find the average rate of change of $f(x) = x^2 - 7x + 3$ from $x = a$ to $x = a + h$. **Simplify your answer** as much as possible.

(9). A small business makes custom LED lights and sells them on an online retail site. There is a fixed monthly cost to $320 to sell online. The total of all costs involved in making the LED lights amounts to $1.60 per light. You plan to sell each box of 15 lights for $60.00.

    (a) (4 points) Write a linear cost function $C(q)$ for the total cost of making and selling q boxes of lights in a given month. Please write your function in **slope-intercept** form.

    (b) (3 points) Write a linear profit function $P(q)$ for the total profit from making and selling q boxes of lights in a given month. Please write your function in **slope-intercept** form.

    (c) (6 points) How many boxes of lights do you need to sell in a month in order to earn a profit of $4,000 for that month? *Round your answer to the nearest box.*

(10). (6 points) Suppose a chemical manufacturer wishes to fill an order for 800 gallons of a 25% acid solution. The manufacturer only stocks 20% acid solutions and 40% acid solutions. Setup, but **DO NOT SOLVE**, a system of equations to find how many gallons of each in-stock solution must be mixed to fill the order. *Make sure to clearly identify your variables.*

(11). Solve the following systems of linear equations:

   (**a**) (4 points)

$$5a + c = -4$$
$$8a - 3c = -34$$

   (**b**) (6 points)

$$3c + 5v + 4z = 6$$
$$-2c - 5v - 4z = -5$$
$$-6c + 2v + 4z = 0$$

(12). Starting with the basic function $f(x) = |x|$, the function $g(x)$ is obtained by applying the following transformations to $f(x)$ in the given order:

1. Shift the graph 3 units to the right,

2. Shrink the graph vertically by a factor of $\frac{1}{2}$,

3. Reflect the graph across the x-axis,

4. Shift the graph upward 5 units.

(**a**) (5 points) Find the formula for $g(x)$.

(**b**) (5 points) Sketch the graph of $y = g(x)$. Plot and label at least two points on the transformed graph.