Name (Print): _____

Username.#: _____

Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

Math 1130
Autumn
Sample Exam 1b

This exam contains 8 pages (including this cover page) and 7 problems. Check to see if any pages are missing. The exam is worth 100 points. The value of each question is listed below.

The following rules apply:

- You have **55 Minutes** to complete this exam.
- You may **not** use your books or notes on this exam.
- Please write clearly.
- **Partial Credit**: You are required to show your work on each problem of this exam. Incorrect answers with supporting work may receive partial credit. Any questions without supporting work will receive no credit. Partial credit might not be awarded on some questions.
- Calculators are permitted with the exception of calculators that have symbolic algebra or calculus capabilities. In particular, the following calculators (and their upgrades) are not permitted: TI-89, TI-92, TI-Nspire CX CAS, and HP-49. In addition, neither PDAs, laptops, nor cell phones are permitted.
- Unless otherwise specified, make sure your answers are in **exact form** (i.e. not a decimal approximation).
- Please write your answers in the boxes provided unless otherwise instructed.
- A random sample of graded exams will be copied before being returned.

Page	Points	Score
2	18	
3	16	
4	16	
5	16	
6	18	
7	16	
Total:	100	

1. Solve the equations. Show all of your work. **Solutions by calculator will receive no credit.**

   (a) (6 points) $\sqrt{x} + \sqrt{x+2} = 3$. Write your answer as a fraction. Separate multiple solutions with a comma.

   $x =$ ☐

   (b) (6 points) $\dfrac{2}{x-2} - \dfrac{x+1}{x+4} = 0$. Write your answer as a fraction. Separate multiple solutions with a comma.

   $x =$ ☐

   (c) (6 points) Solve for r in the equation $s = \dfrac{10}{1+r\,t}$

   $r =$ ☐

2. Answer the following multiple choice questions. No need to show work. **Circle the correct answer**

(a) (4 points) Solve the inequality below

$$\frac{6-t}{-2} < \frac{1+3t}{-2}$$

(a) $(-\infty, 2.5)$ (b) $(-\infty, 1.25)$ (c) $(-\infty, 2.5]$

(d) $(1.25, \infty)$ (e) $(2.5, \infty)$ (f) None of the above

(b) (4 points) Determine the value of

$$(5-2)!$$

(a) -3 (b) 3 (c) 6

(d) 60 (e) 118 (f) None of the above

(c) (4 points) Which of the following lines passes through the point (6, 1) and is perpendicular to the line $2x + 3y = 6$?

(a) $y = -\frac{3}{2}x + 10$ (b) $y = -\frac{3}{2}x + \frac{15}{2}$ (c) $y = -\frac{2}{3}x + 5$

(d) $y = -\frac{2}{3}x + \frac{20}{3}$ (e) $y = \frac{3}{2}x - 8$ (f) $y = \frac{3}{2}x + \frac{9}{2}$

(g) None of the above

(d) (4 points) Find the domain of $f(t) = \frac{t}{\sqrt{2t-3}}$.

(a) All real numbers except 1.5 (b) $(0, 1.5)$ (c) $[1.5, \infty)$

(d) All real numbers except 1.5 and 0 (e) $(1.5, \infty)$ (f) None of the above

3. **Circle your answer** or **fill in the blank**

(a) (4 points) Determine the composition $(f \circ g)(x)$ for $f(x) = \sqrt{x^2 - 1}$ and $g(x) = 2x^4$.

(a) $\sqrt{2x^4 - 1}$ (b) $\sqrt{2x^8 - 1}$ (c) $\sqrt{4x^8 - 1}$

(d) $2(x^2 - 1)^2$ (e) $2\sqrt{x^4 - 1}$ (f) $2(x^2 - 1)^4$

(g) None of the above

(b) (4 points) Write the function $F(x) = \sqrt{x^2 + x}$ in the form $(f \circ g)(x)$ by choosing appropriate functions f and g.

$f(x) =$ _____ $g(x) =$ _____

(c) (8 points) For both of the following parts, consider the function

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

i. The vertex is

(a) $(-1.5, -2)$ (b) $(-0.75, -3.125)$ (c) $(-0.333, -2.778)$

(d) $(1.5, 7)$ (e) $(0.75, 1.375)$ (f) $(0.333, 0.778)$

(g) None of the above

ii. Find all x-intercepts. *You may need to circle more than one*

(a) -4 (b) -2 (c) -0.5

(d) 4 (e) 2 (f) 0.5

(g) None of the above

4. (8 points) Let $f(x) = \dfrac{4}{2x-3}$. Determine the expression for $\dfrac{f(x+h)-f(x)}{h}$. You must simplify your result.

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

5. (8 points) Suppose consumers will purchase q units of a product at a price of $\dfrac{400}{q} + 7$ dollars per unit. What is the minimum number of units that must be sold in order that sales revenue will be greater than \$10,000?

$$q = \boxed{}$$

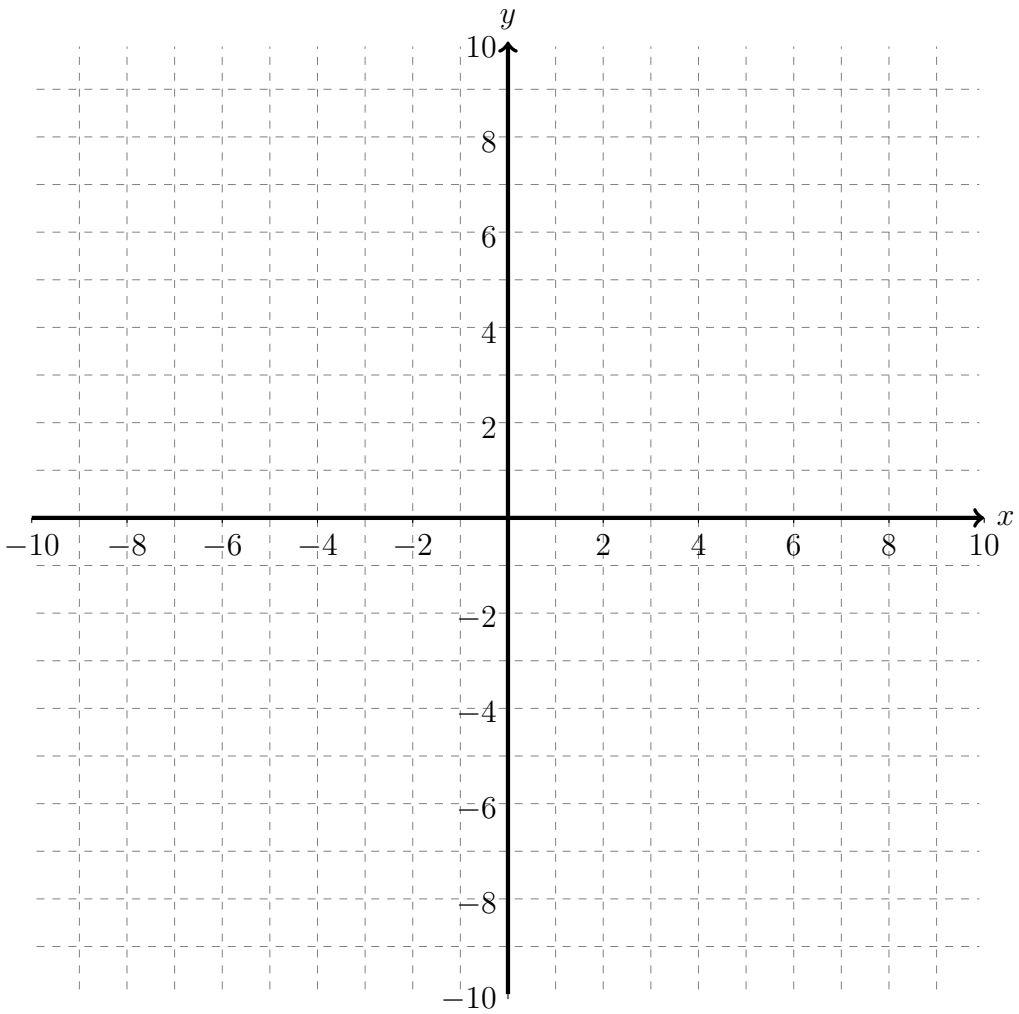
6. The piecewise-defined function $P(x)$ is given by:

$$P(x) = \begin{cases} x + 5 & \text{if } x \leq -3 \\ x^2 - 9 & \text{if } -3 < x \leq 1 \\ -2 & \text{if } x > 1 \end{cases}$$

(a) (6 points) Find the following:

$$P(-6) = \qquad P(-2) = \qquad P(1) =$$

(b) (8 points) Plot and label your points from part a) and then sketch the graph of $y = P(x)$.



(c) (4 points) The range of $P(x)$ is _____ (use interval notation)

7. A cupcake company is producing and selling cupcakes for a festival. Assuming that the demand equation is linear, the company anticipates a demand equation of $p = 9.2 - 0.023q$, where p denotes the price (in dollars) of a cupcake and q denotes the quantity of cupcakes.

   (a) (4 points) Determine the revenue equation.

   $r =$ ☐

   (b) (4 points) Algebraically, determine the quantity that gives the maximum revenue in your equation above. Give your answer to two decimal places. Calculator solutions will not be granted credit.

   The quantity is $q =$ ☐

   (c) (8 points) The initial cost to attend the festival is \$300 and cupcakes cost \$1.80 each to produce. Determine the profit equation given that q cupcakes are sold. Use the result of part (a) if necessary.

   $P =$ ☐

Scrap work