Math 0031 **Sample Exam 1**

Spring 2017 **Name:** _____

No calculators, no notes, no books are permitted.

SHOW ALL WORK (no work = no credit). Write neatly. Simplify your answers when possible.

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1. Consider the relation $\{(-2,3),(0,4),(3,3),(4,3),(6,-1)\}$.

   (a) (4 points) Determine whether the relation is a function.

   (b) (4 points) Identify the domain and the range.

2. (5 points) Find a point-slope equation of the line that has y intercept -8 and is parallel to the line $y + 2x = 3$.

3. (8 points) Solve the compound inequality $x - 2 \leq 3 + 2x < 9 - x$.

4. (8 points) A distance between a town A and a town B is 275 miles. At 1 pm a car leaves town A and goes to town B. At the same time a bus leaves town B and goes to town A. The car and the bus meet at 3:30 pm. The car runs 10 mph faster than the bus. Find the speed of the car.

5. (10 points) For the function $f(x) = x^3 + 5$ find the difference quotient $\dfrac{f(x+h) - f(x)}{h}$.

6. Simplify. Write answers in the form $a + bi$ where a and b are real numbers.

(a) (4 points) $(5 + 3i) - (8 - 3i)$

(b) (4 points) $(-2 + 5i)(3 - 2i)$

(c) (4 points) i^{33}

(d) (6 points) $\dfrac{-2 + 5i}{3 - 2i}$

7. $f(x) = -\frac{2}{3}x^2 + 4x - 4$.

(a) (6 points) By completing the square write $f(x)$ in the form $a(x-h)^2 + k$.

(b) (2 points) Find the vertex and the axis of symmetry of $f(x)$.

(c) (2 points) Find the interval on which $f(x)$ is increasing and the interval on which it is decreasing.

(d) (3 points) Sketch the graph of the function $f(x)$. Mark the vertex and draw the axis of symmetry.

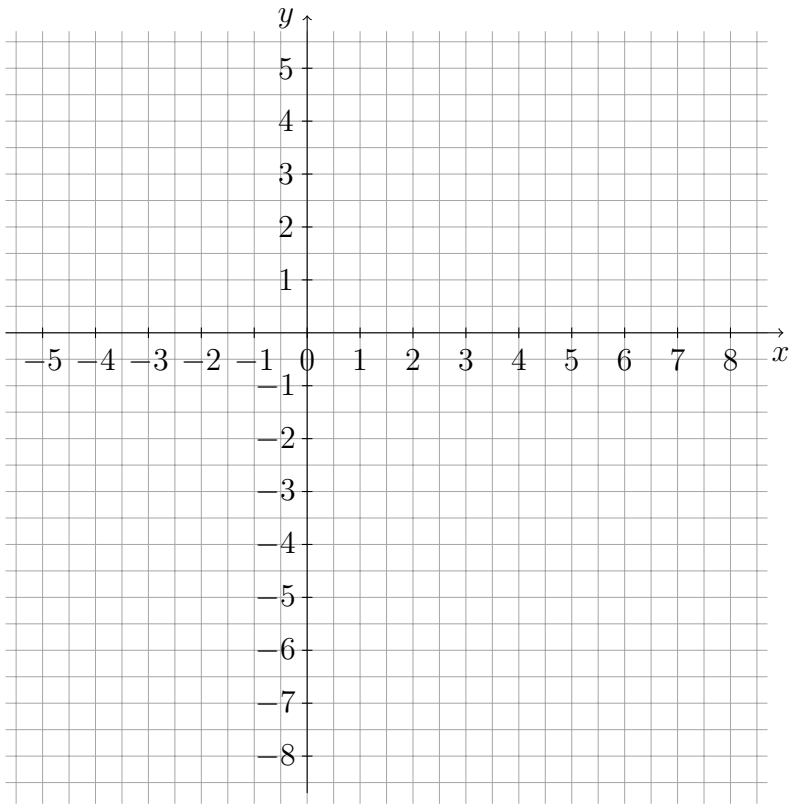

Figure 1: Graph of the function $f(x) = -\frac{2}{3}x^2 + 4x - 4$.

8. (10 points) Solve the equation $\dfrac{2x}{x+3} - \dfrac{1}{x+1} = 0$.

9. (10 points) Solve the equation $|3x+1| - 4 = -1$.

10. (a) (8 points) Solve the inequality $|x-4| > 1$ and write interval notation for solution set.

(b) (2 points) Graph the solution set.