**MA 135: College Algebra** (Fall 2016)
Instructor: Justin Ryan
Review for Midterm Exam 2

**How to use this handout**—Complete all problems, showing enough work. Problems on the midterm exam will be similar to these in nature, but this review packet is **not** meant to be comprehensive. **You should still study your notes and review your homework and Good Problems**.

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**Important Announcement**—You will not be allowed to use a calculator or any other electronic devices on the midterm exam. You will however be permitted to use one $3 \times 5$ in$^2$ note card of your own hand-written notes. If your paper is too large, I will cut it. If your notes are not hand-written (if there are pictures or typed portions), I will cut it.

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**1**. A projectile is thrown upward so that its distance above the ground after $t$ seconds is

$$h(t) = -10t^2 + 240t \quad \text{feet.}$$

After how many seconds does it reach its maximum height? What is the maximum height?

**2**. Solve the equation $|3x + 6| - 2 = 7$.

**3**. Let $f(x) = 9x - 3$ and $g(x) = 2x + 8$. Find a formula for $fg$.

**4**. Let $f(x) = \sqrt{x+3}$ and $g(x) = 8x - 7$.

(*a*) Find a formula for $f \circ g$.

(*b*) What is the domain of $f \circ g$?

**5**. Solve the inequality and plot your solution on a number line.

$$|x - 5| - 9 > 9$$

**6**. State whether the vertex of the function is a maximum or minimum, and give the corresponding maximum or minimum value of the function.

$$f(x) = x^2 + 12x + 32$$

**7**. Identify the vertex of the parabola.

$$P(x) = 3x^2 - 18x + 31$$

**8**. Solve the inequality analytically. Support your answer graphically. Give exact values for the endpoints.

$$x^2 + 5x \leq -6$$

**9**. Find the difference quotient $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$, for the function $f$ and completely simplify.

$$f(x) = 4x - 12$$

**10**. Find the difference quotient $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$, for the function $f$ and completely simplify.

$$f(x) = 3x^2 - 6x$$

**11**. Divide as indicated. Write the quotient in standard form.

$$\frac{3-9i}{5-7i}$$

**12**. Solve the inequality analytically, writing the solution set in interval notation.

$$8 < \frac{3x-10}{3} < 13$$

**13**. Find $(f+g)(4)$ where $f(x) = x-1$ and $g(x) = x+2$.

**14**. Solve each equation or inequality.

(*a*) $|4x+8| = 4$

(*b*) $|4x+8| < 4$

(*c*) $|4x+8| > 4$

**15**. Consider the function $P(x) = 2x^2 + 8x + 5$.

(*a*) Write $P$ in vertex form.

(*b*) Identify the vertex and axis of symmetry.

(*c*) State the domain and range of $P$.