Midterm Exam I
Fall 2013, MAT172 Section B401[19441]
October 1st, 2013. 9:00AM–10:40AM.

Instructions: Print your name on the exam booklet. This exam is closed-book and closed-note. You cannot use any electronic device in this exam. You are not allowed to talk to other students. Write all details explicitly. Answers without justifications and/or calculation steps may receive no score.

For problems asking a graph of a function, explicitly write all x- and y- intercepts and vertex if exists.

Part I — 4 points each, total 48 points

1. (Sample Final I-1) Find the domain of the following function:

$$f(x) = \frac{1}{x}.$$

2. (Sample Final I-1) Find the domain of the following function:

$$f(x) = \sqrt{x-1}.$$

3. (Sample Final I-3) Draw the graph of $y = -2|x| + 2$.

4. (Sample Final I-3) Draw the graph of $y = |x + 7| + 6$.

5. (Sample Final I-4) Write an equation of the line through $(0, 0)$ and perpendicular to the line $y = 2x$. Sketch its graph.

6. (Sample Final I-4) Write an equation of the line through $(1, -1)$ and parallel to the line $5x + 15y = 30$. Sketch its graph.

7. (Sample Final I-6) Draw the graph of $y = \sqrt{x-7}$.

8. (Sample Final I-6) Draw the graph of $y = \sqrt{1-x}$.

9. (Sample Final I-8) A straightline l has its x-intercept $(1, 0)$ and y-intercept $(0, 1)$. Write the equation of the line L.

10. (Sample Final I-8) A straightline m passes through two points $(2, 1)$ and (4,5). Write the equation of the line m.

11. (Sample Final I-11) Let $f(x) = 2x - 1$. Compute and simplify the difference quotient given by $\frac{f(x+h)-f(x)}{h}$.

12. (Sample Final I-11) Let $f(x) = x^2$. Compute and simplify the difference quotient given by $\frac{f(x+h)-f(x)}{h}$.

Part II — 6 points each, total 12 points

13. (Sample Final I-15) Draw the graph of

$$f(x) = \begin{cases} 3x + 2 & \text{for } x \leq 1 \\ -x + 2 & \text{for } x > 1 \end{cases}$$

14. (Sample Final I-15) Draw the graph of

$$f(x) = \begin{cases} x + 5 & \text{for } x < 4 \\ \frac{1}{2}x - 2 & \text{for } x \geq 4 \end{cases}$$

Part III — 5 points each, total 20 points

15. Solve the following quadratic equation using completing the square(No score will be given if you did not use completing the square):

$$x^2 - 2x - 1 = 0.$$

16. Draw the graph of $y = (x - 1)^2$.

17. Given $f(x) = 2x + 1$ and $g(x) = 1 - x$, compute composition of f with g. i.e. calculate $f \circ g(x)$.

18. Let a circle C has its radius r, and is centered at $(1, -1)$. If it is provided that C passes through $(-1, -1)$, what is the radius r?