Math 120 A Winter 2017
Mid-Term Exam Number Two
February 23, 2017

Name: _____   Student ID no. : _____

Signature: _____   Section: _____

1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all four questions.

- Show all work for full credit.

- The only calculator you may use during this exam is a TI-30XIIs. All other electronic devices are not allowed, and should be turned off and put away for the duration of the exam.

- If you use a trial-and-error or guess-and-check method when an algebraic method is available, you will not receive full credit.

- You may use one hand-written 8.5 by 11 inch page of notes. Write your name on your notesheet and turn it in with your exam.

- You have 50 minutes to complete the exam.

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1. You have 1200 meters of fencing with which to enclose a rectangular piece of land. You will also use some of the fencing to partition the enclosure into six sections as shown.
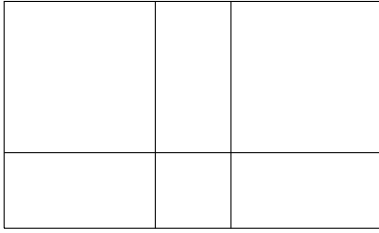
What should the dimensions of the rectangle be to enclose the maximal area?

2. (a) Let $g(x) = x^2 + 6x + 3$ for $x \leq -3$. Find $g^{-1}(x)$.

(b) Let $f(x) = 3x - 1$ and $h(x) = x^2 - 2$. Find the fixed points of $f(h(x))$.

3. City A had a population of 2.1 million in the year 2000. City A's population doubles every 44 years.

City B's population increases at a rate of 2% per year. In the year 1990, the population of City B was half the population of City A.

When will the populations of City A and City B be equal? Give you answer in years after the year 2000.

4. (a) Let $f(x) = |2x + 1|$. Give the multipart rule for the function $g(x)$ whose graph is the graph of $f(x)$ shifted 3 units to the left and 2 units down.

(b) Suppose the maximum value of a function $h(x)$ occurs when $x = 4$. For what x value does the maximum value of $\frac{1}{2}h(4x - 1) + 8$ occur?

(c) Suppose the domain of $r(x)$ is $-4 \le x \le 5$ and the range of $r(x)$ is $1 \le y \le 8$. Give the domain and range of $-5r(2 - x) - 6$.