

Math 120 A Autumn 2011
Mid-Term Exam Number Two
November 17, 2011

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.
- You may use a scientific calculator during this examination. Graphing calculators are not allowed. Also, 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.

1. Bianca and Dennis are moving in the xy -plane at constant speeds along straight lines. Bianca starts from $(3, 4)$ and reaches $(-8, 2)$ in 8 seconds. Dennis starts from $(-5, 3)$ and heads toward $(1, 0)$, getting there in 6 seconds.

(a) Find Bianca's parametric equations of motion.

(b) Find Dennis' parametric equations of motion.

(c) When are Bianca and Dennis closest together?

2. Mortimer measures the length of the grass on his lawn at the same time every day. The length of the grass on Mortimer's lawn is a linear-to-linear function of time. Today, it is 3 cm high. Tomorrow it will be 4 cm high. One week from today, it will be 6 cm high.

(a) How high will the grass be 30 days from today?

(b) When will the grass be 5 cm high?

3. City A's population doubles every 19 years. City B's population triples every 28 years.
In the year 2000, City A's population was 40,000.
In 2010, City B's population was twice that of City A.
When will City B's population reach 500,000? Express your answer in years after 2000.

4. Let $f(x) = x^2 - 10x + 19$.

(a) Let $g(x)$ be $f(x)$ restricted to $x \leq 5$. Find $g^{-1}(x)$.

(b) Let $h(x)$ be the function whose graph is the result of shifting the graph of $f(x)$ 3 units to the right and 4 units down. Solve the equation

$$h(x) = 2.$$