Math 120 A Spring 2017
Mid-Term Exam Number Two
May 18, 2017

Name: _____ Student ID no. : _____

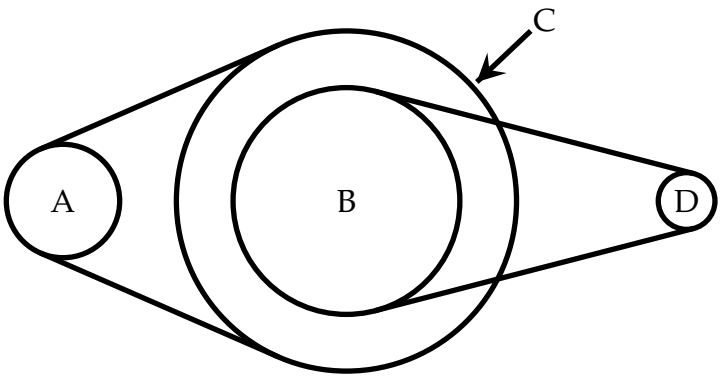
Signature: _____ Section: _____

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, two-sided, 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. You have a system of four pulleys connected in pairs by belts.



Pulley B and pulley C are attached to the same axle and rotate together.
Pulley A has a radius of 3 cm and an angular speed of 13 rpm.
Pulley B has a radius of 4 cm.
Pulley D takes 2.1 seconds to make one revolution, and has a radius of 1 cm.
What is the radius of pulley C?

2. An island has a population of boars and monkeys.

   In the year 1930, there were 400 boars on the island.

   The boar population increases at the rate of 2.1 percent per year.

   The monkey population triples in the time it takes the boar population to double.

   In 1980, there were 5000 monkeys on the island.

   When will there be 10 monkeys per boar on the island? (Give your answer in the form "X years after the year Y".)

3. You are studying for an exam. You know that the more you study, the better your score on the exam will be, but that no matter how hard you study you will not do better than a score of 96. If you study for 10 hours, your score will be 66. If you study for 20 hours, your score will be 87.

   Assume that your score on the exam is a linear-to-linear rational function of the number of hours that you study.

   How many hours do you need to study to achieve a score of 92?

4. Let $f(x) = |\frac{1}{2}x - 3|$.

   (a) Let $g(x)$ be the function whose graph is the graph of $f(x)$ shifted 2 units to the right and 1 unit up. Write the multipart rule for $g(x)$.

   (b) Find the fixed points of $g(x)$.