

Math 120 A Spring 2011
Mid-Term Exam Number Two
May 19, 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. Over time, Frank's accuracy at the game of darts gets better and better. When Frank was 20 years old, he was only 62 percent accurate. When he was 30 years old, he was 85 percent accurate. Assume that his accuracy will always increase, and will approach arbitrarily close to 100 percent if he lives long enough. Suppose Frank's accuracy percentage is a linear-to-linear function of his age. How old will Frank be when he is 95 percent accurate?

2. Let $f(x) = x + 2|x - 3|$, and $g(x) = 3x - 1$.

(a) Find all solutions to the equation $f(g(x)) = -4x$.

(b) Let $h(x) = g(\sqrt{x}) + x + 1$. Find $h^{-1}(x)$.

3. The population of the city of Gub has a doubling time of 63 years. In 1990, Gub's population was 20,000, while the city of Lok's population was 10,000. In 2005, Gub's population was 50 percent more than the population of Lok in 2005.

Assuming Lok's population is growing exponentially, when will the cities have equal populations? Express your answer in years after 1990.

4. Each of the wheels of a bicycle has a radius of 32 cm. The rear sprocket has a radius of 3 cm. What radius should the front sprocket have to achieve a speed of 30 km per hour while pedaling at 100 rpm (revolutions per minute)?

