

Math 120 A - Spring 2007
Final Exam
June 2, 2007

Name: _____

Student ID no. : _____

Signature: _____

Section: _____

1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
Total	70	

- Complete all questions.
- You may use a calculator during this examination. Other electronic devices are not allowed, and must be turned off for the duration of the exam.
- If you use a trial-and-error or guess-and-check method, or read a numerical solution from a graph on your calculator 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.
- Show all work for full credit.
- You have 170 minutes to complete the exam.

1. Olga is a marathon runner, and she is training to improve her time. Currently, she can run a marathon in 170 minutes. If she trains for another 50 hours, she will be able to run a marathon in 160 minutes. If she then trains an additional 50 hours, she will then be able to run a marathon in 155 minutes.

Assume that her marathon time is a linear-to-linear function of the amount of time she spends training. Will she ever be able to run a marathon in under 138 minutes? Explain.

2. Maria is hiking near the Circular Forest, which has a circular shape with a 4 km radius. She begins hiking from a point 6 km west, and 1 km north of the center of the forest. After hiking due east for 4 km, she turns and hikes due south until she leaves the forest.

If she hikes at a constant 2 km/hour, for how much time is she inside the forest?

3. The population of the city of Flom is growing exponentially. In the year 2000, the city of Flom had a population of 1,200. In 2005, Flom's population will be 1,500.

In the year 1994, the city of Hamm had a population of 2,000. The population of Hamm triples every 56 years.

When will the two populations be equal? Express your answer in years after the year 2000.

4. Sarah is trying to measure the height of a tall building. From a point on the ground a certain distance from the building, she measures the angle to the top of the building to be 67° . She then moves 50 feet further from the base of the building, and measures the angle again: this time, it is 65° .

How tall is the building?

5. Jessie is riding a ferris wheel. From when the ride starts, it takes her 3 seconds to reach the lowest point on the ride, and 13.3 seconds (from the start) to reach the highest point on the ride. The highest point on the ride is 130 feet off the ground, and the lowest point is 15 feet off the ground.

How high off the ground is she after riding the ferris wheel for 2 minutes?

6. Fred is organizing a concert. The amount of money Fred will make from his concert is a quadratic function of the price he charges for tickets. If he charged nothing, he would make no money. He would make the most money if he charged \$20, and he would make \$500 if he charged \$10.

How much will he make if he charges \$18?

7. An unwavering cat walks in a straight line from a point 50 feet east and 28 feet north of a statue. The cat heads directly to a point 10 feet west and 70 feet south of the statue. How close does the cat come to the statue?