

Math 120BDE - Autumn 2003
Mid-Term Exam Number One
October 23, 2003

Name: _____

Section: _____

1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all questions.
- You may use a calculator during this examination. Other calculating devices are not allowed.
- 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 50 minutes to complete the exam.

1. A radar has a range of 45 km. A ship is traveling east at 25 km/h starting from a point 55 km west and 15 km north of the radar. After 2 hours, the ship changes course and begins traveling south at 25 km/h. For what length of time does the ship appear on the radar?

2. A new high-speed railway line is being created to connect Springfield with Juniper. Juniper is 40 miles east and 35 miles north of Springfield, and the track for the railway will be laid in a straight line between the towns. Shelbyville is located 6 miles west and 15 miles south of Juniper. Where should a station on the railway be located to be as close as possible to Shelbyville? How far from Shelbyville would it be?

3. Let $f(x) = x^2 - 3$, and $g(x) = |x| - \frac{1}{2}x$.

(a) Find $g(f(x))$ and write its multipart rule.

(b) Find all solutions to the equation

$$g(f(x)) = 2.$$

4. Suppose you run a movie theater and want to maximize the amount of money you take in with each showing of a movie. You have found that if you charge \$6 per ticket, you will sell 220 tickets, and if you charge \$9, you will sell 180 tickets. Assuming that the number of tickets you sell is a linear function of the ticket price, what price should you charge to get the most money?