

MATH 120A  
Exam 1  
Version 1  
January 30, 2003

Name \_\_\_\_\_

Section \_\_\_\_\_

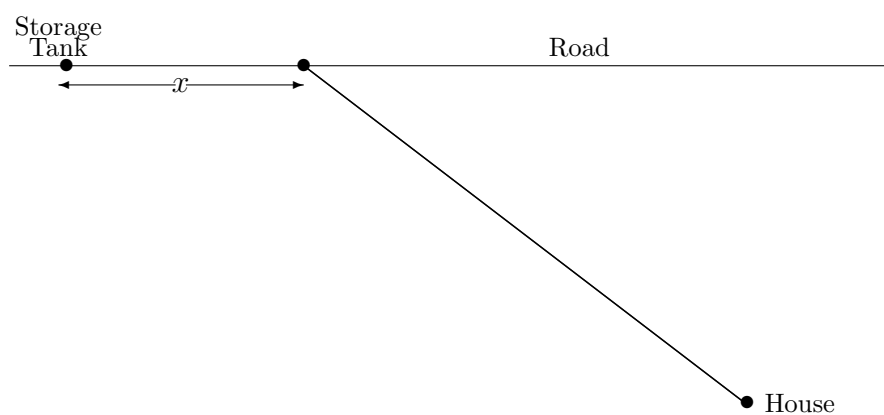
|       |    |  |
|-------|----|--|
| 1     | 5  |  |
| 2     | 6  |  |
| 3     | 5  |  |
| 4     | 12 |  |
| 5     | 10 |  |
| 6     | 12 |  |
| Total | 50 |  |

- You are allowed to use a calculator and one sheet of hand-written notes.
- Complete all questions.
- Show all your work and clearly indicate your final answer.
- When rounding is necessary, unless otherwise instructed, you may round your **final answer** to two digits after the decimal.
- Give answers with appropriate units.
- Raise your hand if you have a question.
- You have 50 minutes to complete the exam.

GOOD LUCK!



3. (5 points) A gas pipeline is to be constructed so that it runs from a storage tank to a house. The storage tank is on a straight stretch of road that runs east-west. The house is 700 feet east and 450 feet south of the storage tank. It costs \$12 per foot to lay the pipe along the road and \$17 per foot to lay the pipe off the road. Let  $x$  be the length of pipe (in feet) laid along the road and give a formula for  $C(x)$ , the total cost of the pipeline.



4. (12 points) On January 1, 1995 ( $t = 0$  years), Joannie owned 75 CDs and 210 books. On January 1, 2003 ( $t = 8$  years), Joannie owned 304 CDs and 490 books.

(a) Find a linear model  $D(t)$  for the number of CDs that Joannie owns at time  $t$ .

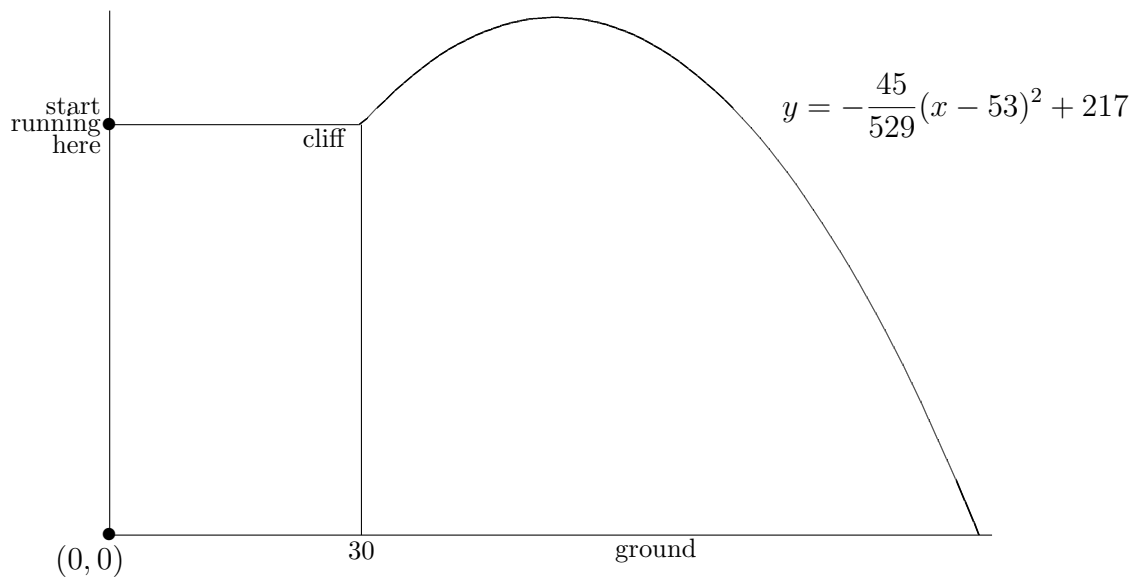
(b) Find a linear model  $B(t)$  for the number of books that Joannie owns at time  $t$ .

(c) According to your models, how many books does Joannie own when she owns 250 CDs? (Round to the nearest whole number of books.)

(d) According to your models, during what year does Joannie own exactly twice as many books as she owns CDs?

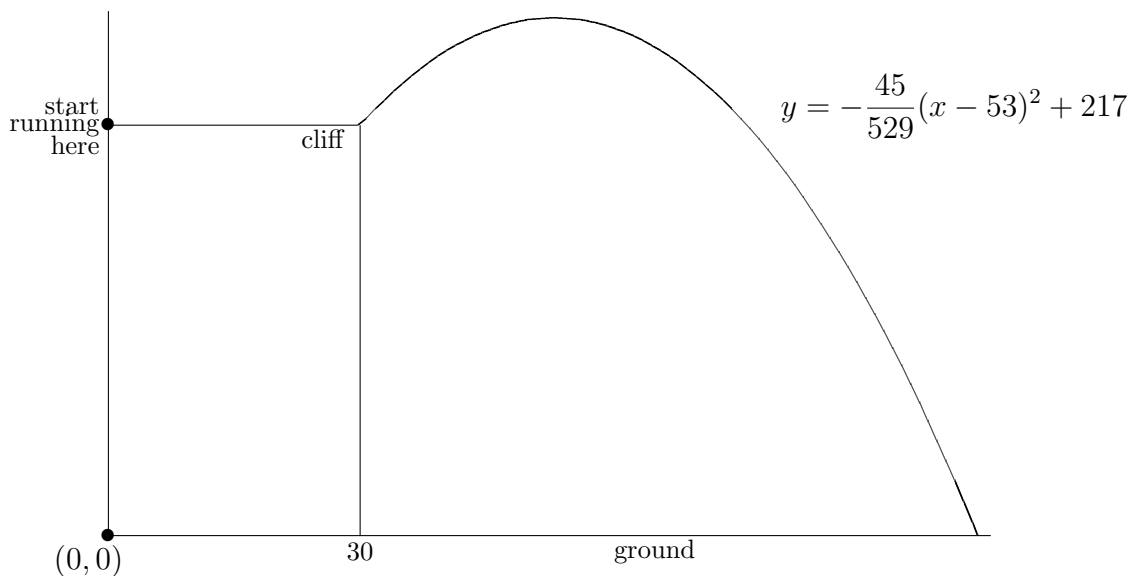
5. (10 points) Because of modern sprinkler-irrigation systems, farmers often plant crops in fields that are circular in shape. Farmer Jones has a circular field whose radius is 50 yards and whose center is 70 yards east and 40 yards north of his house.
- (a) Impose a coordinate system with the house at the origin. Give the equation of the circle that bounds the field.
- (b) A boulder is embedded in the ground 100 yards east and 10 yards north of the house. Does the boulder lie in the field? (You must show some work to justify your answer.)
- (c) Farmer Jones walks directly east from the house at a rate of 4 miles per hour. How many seconds does it take Farmer Jones to reach the nearest edge of the field? (Reminder: One mile is 5280 feet and one yard is 3 feet.)

6. (12 points) Wile E. Coyote is wearing a faulty jet-pack. He runs 30 feet and jumps off a cliff so that he follows the parabolic path in the picture below. (A coordinate system has been imposed. Notice the location of the origin.)



- (a) How high is the cliff?
- (b) What is Coyote's maximum height above the ground?

Here's the picture again:



- (c) Feeling sorry for Coyote, Roadrunner places a mattress on the ground for him to land on. How far *from the base of the cliff* should Roadrunner place the mattress?

- (d) Give the multi-part rule for  $h(x)$ , Coyote's height above the ground when he is  $x$  horizontal feet from his starting location.