Math 120E **First Midterm** **Autumn 2002**

Your Name

Your Signature

Student ID #

	David		Avanti	
Section	1:30	12:30	1:30	12:30
(circle one)	EA	EB	EC	ED

Problem	Total Points	Score
1	12	
2	13	
3	12	
4	13	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- Do not share notes.
- In order to receive credit, you must show your work. Do not do computations in your head or only on your calculator. Instead, write them out on the exam paper.
- **Place a box around $\boxed{\text{YOUR FINAL ANSWER}}$ to each question.**
- If you use a trial and error (or guess and check) method when an algebraic method is available, you will not receive full credit.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

1 (12 points) Solve the following.

(a) (4 points) Let $f(x) = 3x^2 - x$. Compute and simplify $\dfrac{f(2+h) - f(2)}{h}$.

(b) (4 points) Find the vertex of the parabola $y = \frac{1}{2}x^2 + 2x - 3$. Then sketch the graph.

(c) (4 points) Solve for x in $\dfrac{x}{x-1} - \dfrac{3}{x+1} = 2$

2 (13 points) Tafu is an Econ professor. In 1996 he earned \$43,000 and in 2000 he earned \$48,000. Nell fries chicken at Ezell's. In 1998 she earned \$17,000 and in 2001 she earned \$21,000.

(a) (3 points) Give a linear function relating Tafu's salary T to the year t.

(b) (3 points) Give a linear function relating Nell's salary N to the year t.

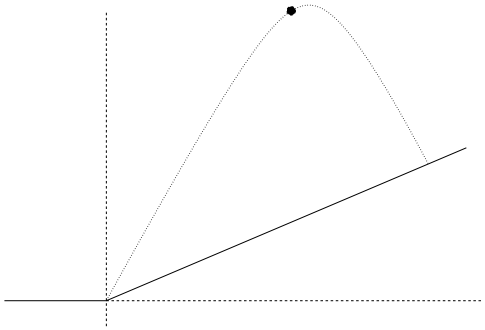
(c) (3 points) In what year will Tafu earn \$28,000 more than Nell?

(d) (4 points) In what year will Tafu earn twice as much as Nell?

3 (12 points) Suppose you have a function $y = f(x)$ such that the domain of $f(x)$ is $1 \leq x \leq 6$ and the range of $f(x)$ is $-2 \leq y \leq 10$. Let $g(x) = \frac{4}{3}x^2 - \frac{8}{3}x + 2$.

- What is the domain of $f(g(x))$?
- What is the range of $f(g(x))$?

4 (13 points) Tafu is standing at the bottom of a hill with a soccer ball. Impose a coordinate system as shown in the picture. The hill slopes up at a constant rate of 2 vertical feet for each 3 horizontal feet. Tafu kicks the ball and it follows the path given by $y = -\frac{1}{6}x^2 + \frac{17}{3}x$.



(a) (6 points) What is the maximum height of the ball above the hillside?

(b) (7 points) How far is the ball from Tafu when it hits the hillside?