

**Math 151**  
**Quiz 6**  
**Spring 2006**

Important: **Do two of the three problems.** Clearly indicate which three you want me to grade (10 points each, 20 points total, no bonus credit).

Show all work in a neat and organized fashion. Clearly indicate your answers.

1. Given:

$$\begin{aligned}f(x) &= 7x^4 - 28x^3 + 41x^2 - 26x + 82, \\f'(x) &= 28x^3 - 84x^2 + 82x - 26, \\f''(x) &= 84x^2 - 168x + 82.\end{aligned}$$

Use a graphing calculator to estimate these answers to one or two decimal places.

- (a) Find the critical numbers of  $f$ .
  
  
  
  
  
  
  
  
  
  
- (b) Find the intervals on which  $f$  is increasing or decreasing.
  
  
  
  
  
  
  
  
  
  
- (c) Find the  $x$ -coordinates of all local maxima and local minima of  $f$ .
  
  
  
  
  
  
  
  
  
  
- (d) Find the intervals of concavity.
  
  
  
  
  
  
  
  
  
  
- (e) Find the  $x$ -coordinates of all points of inflection.

2. If  $1500 \text{ cm}^2$  of material is available to make a box with a square base and an open top, find the dimensions for the box with largest possible volume.

3. A rectangular storage container with an open top is to have a volume of  $40 \text{ m}^3$ . The length of its base must be four times the width. Material for the base costs \$20 per square meter. Material for the sides costs \$8 per square meter. Find the dimensions for the cheapest such container.