

Fourth Examination

Wednesday, April 12, 2006

Instructions: This exam should be done on your own paper. The answers should be written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. You may keep this exam sheet. Each entire problem is worth 25 points.

1. Graph a function that has a local minimum at -1 , a local maximum at 1 , but no global minimum or maximum.
2. For $f(x) = x^2 - x$ with x in the interval $[0, 2]$, find the values of x for which:
 - (a) $f(x)$ has a local maximum or local minimum. Indicate which ones are maxima and which are minima.
 - (b) $f(x)$ has a global maximum or global minimum.
3. The total cost $C(q)$ of producing q goods is given by:

$$C(q) = 0.01q^3 - 0.6q^2 + 13q.$$

- (a) What is the fixed cost?
 - (b) What is the maximum profit if each item is sold for \$7? (Assume you sell everything you produce.)
4. The total cost to produce q items is given by

$$C(q) = 0.01q^3 - 0.6q^2 + 13q.$$

- (a) What is the minimum marginal cost?
- (b) What is the average cost $a(q)$ of producing q goods?
- (c) At what production level is the average cost minimum? What is the lowest average cost?
- (d) Compute the marginal cost at $q = 30$. How does this relate to your answer in part 4c? Explain this relationship both analytically and in words.