

PRACTICE EXAM 2
November 2, 2001

There are five questions on the practice exam. Calculators are not allowed.

1 True or false:

- (1) If $f'(c) = 0$, then f achieves a maximum or a minimum at $x = c$.
- (2) If $f''(c) > 0$, then f achieves a minimum at $x = c$.
- (3) $\int f'(x)dx = f(x) + c$.
- (4) If profits are maximize at the sale of x units, then $\overline{MR}(x) = \overline{MC}(x)$.
- (5) Current demand for Cipro is elastic.

2. Compute the following indefinite integrals:

- (a) $\int (x + 4)^5 dx$
- (b) $\int (3xe^{x^2+4x} + 6e^{x^2+4x})dx$

3. Suppose that in a certain company the relationship between the price per unit (say p) of its product and the weekly sales volume in thousands of dollays (say y) is

$$\frac{dy}{dp} = -\frac{y}{2p + 10}.$$

Solve this differential equation if $y = 18$ when $p = \$20$.

4. If the daily demand for a product is given by the function

$$p = 2100 - 10q - q^2/2,$$

and the daily supply before taxation is given by

$$p = 300 + 5q + q^2/2,$$

find the tax per item that maximizes total tax revenue.

5. Consider the function

$$f(x) = x(x - 6)^2.$$

- (a) Find the critical values of $f(x)$
- (b) For each critical value determine whether it is a minimum, a maximum, or a horizontal point of inflection (plateau).
- (c) Determine the values of x (if any) for which $f(x)$ is concave up.
- (d) Determine the values of x (if any) for which $f(x)$ is concave down.
- (e) Determine the points of inflection (if any) for $f(x)$.
- (f) Sketch the graph of $f(x)$.

1.

- (1) F (Could be a plateau)
- (2) F (need also that $f'(c) = 0$)
- (3) T
- (4) T
- (5) F (inelastic)

2. Compute the following indefinite integrals:

(a) $(x + 4)^6/6$

(b) $3e^{x^2+4x}/2$

3. $y = \frac{18\sqrt{50}}{\sqrt{2p+10}}$

4. $t = \$1,100$

5.

(a) $x = 2, 6$

(b) $x = 2$: max; $x = 6$: min.

(c) $x > 4$

(d) $x < 4$

(e) $x = 4$

(f)