

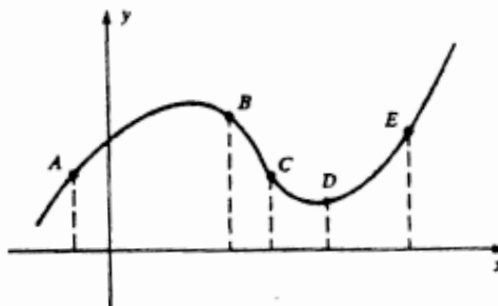
Name: \_\_\_\_\_

**MA1 Exam 5 Review Sheet**

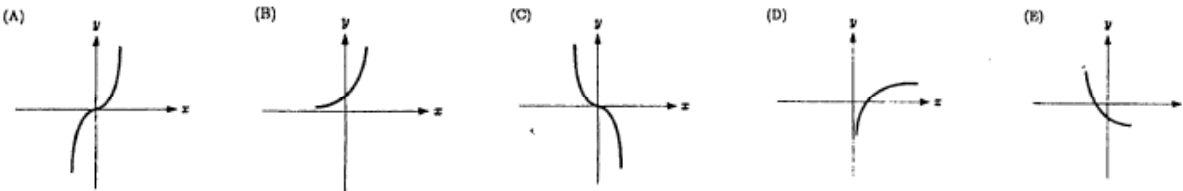
**Exam 5 will be on Wednesday, January 9, 2008. No graphing calculators are permitted.** A scientific calculator may be used, but is not required. Be sure to show all steps clearly using the calculus techniques shown in class. A correct answer with no justification will receive no credit.

- Find two numbers whose difference is 50 and whose product is a minimum.
- A rectangular field is to be bounded by a fence on three sides and by a straight stream on the fourth side. The field is to be divided into two sections by fencing running perpendicular to the stream. Find the dimensions of the field with maximum area that can be enclosed with 1000 feet of fence.
- A cylindrical silo with a flat top is to hold 10,000 cubic feet of grain. The floor of the silo will be the earth. Find the radius of the silo that requires the least material to construct. Leave your answer in terms of  $\pi$ .
- A tank with a rectangular base and rectangular sides is to be open at the top. It is to be constructed so that its width is 4 meters and its volume is 36 cubic meters. If building the tank costs \$10 per square meter for the base and \$5 per square meter for the sides, what are the dimensions of the least expensive tank?
- What are all values of  $x$  for which the graph of  $y = 6x^2 + \frac{x}{2} + 3 + \frac{6}{x}$  is concave downward?

- If the graph at right represents  $y = f(x)$ , at which point(s) on the graph do  $f'(x)$  and  $f''(x)$  have the same sign?



- How many points of inflection does the graph of  $f(x) = 2x^6 + 9x^5 + 10x^4 - x + 2$  have?
- On what interval(s) is the function  $f(x) = \frac{x^2 + 1}{x^2}$  concave upward?
- If, for all  $x$ ,  $f'(x) > 0$  and  $f''(x) < 0$ , which of the following could be a part of the graph of  $f$ ?



- The function  $y = x^4 + bx^2 + 8x + 1$  has a horizontal tangent and a point of inflection at the same value of  $x$ . What is the value of  $b$ ?