

UC Merced: MATH 21 — Exam #2 — April 4, 2008

On the front of your bluebook print (1) your name, (2) your student ID number, (3) your discussion section number and instructor's name (Lei or Yatskar) and (4) a grading table. Show all work in your bluebook and BOX IN YOUR FINAL ANSWERS where appropriate.

A correct answer with no supporting work may receive no credit while an incorrect answer with some correct work may receive partial credit. Textbooks, class notes, calculators and crib sheets are not permitted. There are a total of 5 problems on one side of this paper and a total of 50 points.

Please start each of the 5 problems on a new page. You have 50 minutes to complete the exam.

- (10 pts total: 2 each) Answer the following Always True (T) or False (F). Only your final answers will be graded on these problems.
  - A car drives non-stop 400 mi in 5 hours on I-5 where the speed limit is 70 mph. After hearing this story a policeman can justify giving the driver a speeding ticket since the cars speedometer must have read 80 mph sometime during the trip.
  - If  $f'(x) = x \cos(x) + \sin(x)$  then  $f(x) = x \sin(x) + 2x$  is a particular antiderivative.
  - If  $f'(c) = 0$  and  $f''(c) < 0$  then  $f$  has absolute maximum at  $c$ .
  - Finding a number  $c$  where  $f'(c) = 0$  guarantees that there is a local min or max at  $c$ .
  - If a smile is described by the function  $f(x)$  on  $[a, b]$  then  $f''(x) > 0$  on  $(a, b)$ .
- (8 pts) If a ball is thrown vertically upward, then its velocity after  $t$  seconds is given by  $v(t) = 200 - 20t$ . What is the height reached by the ball after 10 sec if the initial height is  $s(0) = 0$ ?
- (15 pts: 7, 8) Function  $y = \frac{100t}{t^2 + 25}$  describes the fish population in a pond where  $t \geq 0$  is the number of years.
  - What will happen to the fish population after a long time?
  - What is the maximum fish population ?
- (7 pts) Calculate  $y'$  if  $xy^4 = x + 3y$ .
- (10 pts) The area of a square is increasing at a rate of  $10 \text{ cm}^2/\text{min}$ . How fast is the perimeter increasing when the length of the side is 4 cm?