

Your Name

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Your Signature

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Student ID #

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- Turn off all cell phones, pagers, radios, mp3 players, and other similar devices.
- Please write your name at the top of every page.
- This exam is closed book. You may use one  $8.5'' \times 11''$  sheet of handwritten notes (both sides OK). Do not share notes. No photocopied materials are allowed.
- You can use only a Texas Instruments TI-30X IIS calculator.
- In order to receive credit, you must **show all of your work**. If you do not indicate the way in which you solved a problem, you may get little or no credit for it, even if your answer is correct.
- Place 

a box around your answer
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 to each question.
- The pages have problems on **both** sides.
- If you need more room, use the blank last page and indicate that you have done so.
- Raise your hand if you have a question.
- This exam has ?? pages, plus this cover sheet. Please make sure that your exam is complete.

1. (?? total points) Compute the derivatives of the following functions. Do not simplify your answers.

(a) (4 points)  $f(t) = \tan(3t) \cdot e^{\sqrt{t}}$

(b) (4 points)  $g(x) = \frac{\sin^{-1} \sqrt{2x-1}}{2x+1}$

(c) (4 points)  $x = \sin[1 + \cos(1 + \sin(1 + t))]$

2. (?? total points) Consider the curve given by the parametric equations

$$x = t^2 + 6t, y = t^3 + 2t^2$$

(a) (5 points) Find the equation of the tangent line to the curve when  $t = -1$ .

(b) (5 points) Find all times  $t$  when the tangent line has slope 2.

3. (10 points) A flashlight is laying on the ground 25 feet from a wall. It is on and pointed straight at the wall. Isobel is walking straight from the wall to the flashlight at a constant speed of 2 feet/second. She is 6 feet tall. How fast is the length of her shadow on the wall increasing when she is 10 feet from the flashlight? Give units in your answer.

4. (8 points) Compute the equation of the tangent line to the curve  $y = (x - 1)^x$  at the point where  $x = 2$ . Use **exact values** only. Do not give decimal approximations.

5. (10 points) Find all the points  $(a, b)$  on the curve  $2y^3 - 6xy + x^2 = 0$  where the tangent line is vertical.

This page is for extra work.