

MIDTERM #2

Math 124K

name

TA section

You must show all work for full credit; furthermore, showing work may help you get partial credit for problems done incorrectly. Use the backs of the test pages as necessary.

1. Evaluate the derivatives of the following functions.

a. $(\ln x)^3$

b. $x^{\cos x}$

c. $\tan(e^x)$

2. John is at first base and Sally at second in a baseball game; each is touching his or her base. The batter hits the ball and John and Sally simultaneously start running to the next base at speeds of 4 feet per second and 3 feet per second, respectively. How fast is the distance between John and Sally changing now? Is it increasing or decreasing? (HINT: Recall that the bases are 90 feet apart.)

3. Evaluate $\frac{d^{16}}{dx^{16}} (3x^{15})$

4. A bug crawls along the curve $x^4 + xy + y^4 = 3$ in the xy -plane. If his x -coordinate is increasing by 2 units per second at the point $(1, 1)$, then how fast is his y -coordinate changing? Is it increasing or decreasing?

5. A particle moves so that its position $x(t)$ at time t is te^{-t} for $t \geq 0$. Find all points where its acceleration is 0. What is its velocity at each such point?