Midterm 2 Review

Math 150 — Calculus I — Fall 2023

Full Name: _____ Red ID: _____

1. Find the derivative ($f'(x)$) for the following functions:

   (a) $y = x^{\pi e} + e^{\pi x}$

   (b) $y = \sqrt{x + \sqrt{x + \sqrt{x}}}$

   (c) $y = e^{(\frac{1}{x})}\sqrt{x^2 - 1}$

   (d) $y = \sqrt{\frac{1+sinx}{1+cosx}}$

2. If $f(x) + x^2(f(x))^3 = 10$ and f(1) = 2, find $f'(1)$.

3. If $siny + cosx = 1$, find y".

4. Find the equation of the tangent line to the curve $ye^{sinx} = xcosy$ at (0,0).

5. Using logarithmic differentiation, find the derivative of the following:

(a) $y = \frac{e^{-x}cos^2x}{x^2+x+1}$

(b) $y = (sinx)^{lnx}$

(c) $y = \frac{x^{2x}(x-1)^3}{(3+5x)^4}$

6. A particle moves on a vertical line so that its coordinate at time t is $y = t^3 - 12t + 3$, $t \geq 0$.

(a) Find the velocity and acceleration functions.

(b) When is the particle moving upward?

(c) When is the particle moving downward?

(d) Find the distance that the particle travels in the time interval $0 \leq t \leq 3$.

7. The volume of a cube is increasing at a rate of 10 cm^3/min. How fast is the surface area increasing when the length of an edge is 30 cm?