

Name:

Student ID #:

Problem	Total points	Score
1		
2		
3		
4		
Total	50	

- This exam is closed book. You may use one standard sheet of notes.
- Do not share notes.
- Graphing calculators are not allowed. Scientific calculators are OK.
- In order to receive credit, you must show your work. Donot do computations in your head. Instead, write them out on the exam paper.
- **Place a box around your final answer to each question.**
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

1. Find the derivative of the following functions (5+5+5+5+5pts):

a) $f(x) = a^{x+e^x}$

$$\text{b) } g(t) = \text{Sin}(\text{Cos}(x) + e^{\text{Sin}(x)})$$

c) $\phi(x) = \tan^{-1}(a^{x^2+1})$

$$\text{d)} h(x) = \frac{\sqrt{e^x + e^{2x}}}{x + e^x}$$

e) $k(x) = \text{Sin}(\text{Cos}(\text{tan}(x)))$.

2. Use implicit differentiation to find $\frac{dy}{dx}$ at the points where the curve $\text{Cos}(x - y) - y\text{Cos}(x) = 0$ intersects the x-axis. (10 pts)

3. A particle moves along the x-axis, its position at time t given by $x(t) = e^{\sin(t)} + e^{-\sin(t)}$ where t is measured in seconds and x in meters. For $0 \leq t \leq 2\pi$ find the acceleration at **all** times when the velocity of this motion is 0. (5pts)

4. An object is moving on the curve

$$y = \ln(e^{x-\pi} + e^{-x+\pi}) + \sqrt{e^{x-\pi} + \tan^{-1}\left(\frac{x}{\pi}\right) - \frac{\pi}{4}}.$$

If the x-coordinate is changing at the rate of α units per second at the point $(\pi, \ln(2) + 1)$,

a) how fast is the y-coordinate changing at this point? (5pts)

b) how fast is the square of the distance from the point $(0, 0)$ changing when the object is at $(\pi, \ln(2) + 1)$? (5pts)