
Friday, Mar 14, 2008

STUDENT NAME: _____

EXAM II – MATH 135, SPRING 2008

READ EACH PROBLEM CAREFULLY! To get full credit, you must show all work!

The exam has 7 problems on 3 pages! Turn in all pages!

NO GRAPHING CALCULATORS ALLOWED!

- **Problem 1**

- Find the derivative of the following functions [6 pts each]

(a) $f(x) = e^{\sin(3x)}$, $f'(x) =$

(b) $g(x) = \ln(2x + 1)$, $g'(x) =$

- **Problem 2**

Find the equation of the tangent line to the curve

$$y = x^2 e^{x-1}$$

at the point where $x = 1$.

- **Problem 3**

(a) Find the derivative of the function

$$f(x) = \frac{\sqrt{x}}{(x+1)^2}$$

(b) Determine the points (if any) where the tangent line to the graph $y = f(x)$ is horizontal.

- **Problem 4**

Using implicit differentiation, find $\frac{dy}{dx}$, given that $x^2 + 2y^2 = 3$.

- **Problem 5**

(a) Find the linear approximation of $f(x) = \sqrt{1+3x}$ near $x = 0$.

(b) Write down the differential dy , where $y = \sqrt{1+3x}$.

- **Problem 6**

If a (spherical) snowball melts so that its surface area decreases at a rate of $1 \text{ cm}^2/\text{min}$, find the rate at which its diameter decreases when the diameter is 10cm. [Surface area of a sphere is $S = 4\pi r^2$, where r is the radius.]

- **Problem 7**

Gravel is being dumped from a conveyor belt at a rate of $30 \text{ ft}^3/\text{min}$, and it forms a pile in the shape of a cone whose base diameter and height are always equal (see picture). How fast is the height of the pile increasing when the pile is 10 *ft* high? [Volume of a cone is $V = \frac{1}{3}\pi r^2 h$.]