

PRINT NAME: _____

Student ID#: _____

Mathematics 2200 - Test Three
Wednesday, July 18, 2001

Problem #	Points	Score
1	40	
2	10	
3	10	
4	20	
bonus	10	
Total	90	

Show all work or credit will not be given.

No aids are allowed. **NO Calculators!**

Do Not Tear Out Any Pages.

1. Find the derivatives of the following functions and find where their tangent line will be horizontal.

(a) $y = e^{\frac{\ln x}{x^2}}$

(b) $g(x) = (2x^2 - 3x)e^{-x}$

(c) $f(x) = \frac{1}{3 \sin^2 x + 2 \cos^2 x}$

(d) $y = \sin(\cos^2 x)$

2. Find the equation of the line tangent to the given curve $\sin(x + 2y) = 2x \cos y$ at the point $(0, \pi)$.

3. Use a linear approximation $L(x)$ to an appropriate function $f(x)$, with an appropriate value of a , to estimate the number $\sqrt[3]{64.1}$ and $\cos 59^\circ$.

4. Do one of the following two problems. If you have time to do both problems, only one will be credited. You have to state explicitly which one you want to be credited.

I A man is at point A on a bank of straight river, 3km wide, and wants to reach point B , 8 km downstream on the opposite bank, as quickly as possible. He could row his boat directly across the river to point C and then run to B , or he could row directly to B , or he could row to some point D between C and B and then run to B . If he can row at 8 km/h and run at 10km/h. Where should he land to reach B as soon as possible?

II A water trough is to be made from a long strip of tin 6 ft wide by bending up at an angle θ a 2-ft strip on each side. What angle θ would maximize the cross-sectional area?

5. * **Bonus question** (Note: This is not an easy question and will be marked very strictly)
Find all the values of the constant c so that the two curves $y = cx^2$ and $y = \ln x$ have exactly one point in common.