American University of Beirut
Math 101
Dr. H. Yamani
Final Exam
Spring 2004
Name:
Do all of the following problems. Show all your work. No work shown. No credit.

****GOOD LUCK****

1. Use the definition of limit to prove that $\lim_{x\to 2}(4x-2)=6$

2. Find equations for the lines that are tangent to the given curve at the given point.

$x^3y^3+y^2=4x+y$ at $(2,1)$

3. Use the Mean Value theorem for $f(x)=x^2+1$ on any interval [a, b] to prove that there exists a value "c" such that $c=\dfrac{a+b}{2}$

4. Use the linear approximation of $f(x) = \sqrt{x+1}$ at $x = 8$ to approximate $\sqrt{9.1}$.

5. The recursion formula for Newton's method is given by

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

Given $f(x) = x^2 - 2$, $x_0 = 1$. Calculate successive terms x_1, x_2, x_3. What number is being approximated.

6. Evaluate the integral:

$$\int_0^{\pi/4} \frac{\sec^2 x}{(1+7\tan x)^{2/3}}\, dx$$

7. Use the disk method to find the volume of the solid generated by revolving the region bounded by graph of $x = y^2 + 1$ and the line $x = 3$ about the line $x = 3$.

8. Use the washer method to find the volume of the solid generated by revolving the region bounded by $y = x^2$ and $y = 2x$ about the $y - axis$.

9. Use the shell method to find the volume of the solid generated by revolving the region bounded by $y = 2x - x^2$ and the $x - axis$ about the line $x = -1$.

10. Find the area of the region bounded between the curve $f(x) = x^2 + 2x$ and $g(x) = -x + 4$ in the interval [- 4, 2].

11. Find the length of the curve $y = \int_{-2}^{x} \sqrt{3t^4 - 1}\, dt$ on $-2 \le x \le -1$.