MA 125 Test 2 Oct. 2005. NAME_______________________________________

You may not use calculators, notes, or books. Do your own work.

On both Part 1 and Part 2: Justify your answers mathematically. 'Show your work.' **CIRCLE ANSWERS.**

PART 1. Little or no partial credit. 5 points each.

In 1-9 find the derivative of each of the functions. Use parentheses where needed and simplify your answers (collect like terms and leave no complex fractions).

(1.) $f(x) = 2x^3 + e^{5x}$

(2.) $h(x) = x\cos(3x)$

(3.) $g(z) = \frac{z^2}{1+z^3}$

(4.) $w(x) = (x^5 + x - 3)^8$

(5.) $F(z) = \sqrt{5 + z^4}$

(6.) $G(x) = \ln(2 + 3x + x^3)$

(7.) $H(z) = \sin^2(5z)$

(8.) $P(x) = e^{-x} \tan(x)$

(9.) $Q(x) = 3^x$

(10.) Use implicit differentiation to find y', derivative of y if $x^2+xy+y^2 = 4$.

PART 2. Partial credit may be given.

11. (10 pts) Find the equation of the line tangent to the graph of $g(x) = \frac{e^{3x}}{1+e^{3x}}$ at the point $(x, g(x))$ which has $x = 0$.

12. (12pts) A particle moving on a horizontal line has position $s(t) = \frac{t}{1+t^2}$ at time t. (Time t is in seconds and position is in meters).

(a) Find the velocity $v(t)$ at time t.

(b) Find all times at which the velocity is zero.

(c) Find the acceleration $a(t)$ at time t.

(d) Find all times at which the acceleration is zero.

13. (10) The equation $x^3 + y^3 = 3xy + 3$ defines a curve.
(A) Find y' as a function of x and y.

(B) Find an equation for the line tangent to the curve at the point $(x, y) = (1, 2)$.

14. (10pts) Let $w(x) = \ln(1 + x^2)$.
(a) Find all intervals on which $w(x)$ is increasing.

(b) Find all intervals on which the graph of w is concave up.

15. (8pts) Let $F(x) = \sqrt{x}$.
(a) Find the linearization $L(x)$ of $F(x)$ at $x = 9$.

(b) Use the linearization of F to approximate $\sqrt{9.2}$.

Bonus Problem (6 points)

Find all points (x, y) on the curve $x^2 + xy + y^2 = 1$ such that the tangent line is parallel to the line $y = -x + 2$.