Math 3322-001 Exam I-A September 7, 2007
Make-up

Answer the problems on **separate** paper. You do not need to rewrite the problem statements on your answer sheets. Do your own work. Show **all relevant steps** which lead to your solutions. Attach this question sheet to the front of your answer sheets.

1. (32 pts) For each of the following functions find $\frac{dy}{dx}$:

a. $y = \sqrt{\frac{1+x^2}{1-x}}$ b. $y = \tan^3(x^2 - 3x)$

c. $y = x^2\sqrt{2x^3 - x + 1}$ d. $y = \frac{\sin 4x}{x^2 - 3}$

2. (8 pts) Find, using implicit differentiation, $\frac{dy}{dx}$:

a. $x^2 - 3xy^2 + 2y^3 = 2x - 3y$

3. (8 pts) Find the equation of the tangent line to the curve $y = (x^2 + 4x - 2)^2$ at $x = 1$.

4. (24 pts) Evaluate the integrals:

a. $\int \sqrt{2 + 5x^2}\, x\, dx$ b. $\int (3 + 2x^2)^2\, dx$

c. $\int x^2 \sin(3x)\, dx$

5. (8 pts) Find the partial fraction decomposition of:

a. $\frac{3x + 1}{x(x + 2)^2}$

6. (16 pts) Let $\alpha = 2 + 4i, \beta = 5 - 2i, \gamma = -2 - 3i$. Find (in rectangular form):

a. $\alpha^2 - 2i\bar{\gamma}$ b. $\frac{\alpha}{\beta + 2\gamma}$

7. (8 pts) Find all of the square roots of $\alpha = -1 + \sqrt{3}i$.