Math 112 **Exam 2** March 9, 2005

Read each problem carefully. Please show all your work for each problem! Use only those methods discussed thus far in class. No calculators!

1. (10 points) Differentiate

   $$(a)\ f(x) = \arcsin(x^2 + 2x + 3), \qquad (b)\ g(z) = \sin(2z)\sinh(3z).$$

2. (20 points) Integrate

   $$(a)\ \int \tan^2(3x)\,dx, \qquad (b)\ \int \sin^3(x)\cos^2(x)\,dx.$$

3. (10 points) Integrate

   $$\int x \arctan x\,dx.$$

4. (15 points) Integrate

   $$\int \frac{1}{x(x+2)^2}\,dx.$$

5. (15 points) Integrate

   $$\int \frac{2x^2 + 3x + 4}{x^2 + 16}\,dx.$$

6. (15 points) Integrate (Hint: use trigonometric substitution)

   $$\int_0^1 \sqrt{4 - x^2}\,dx.$$

7. (15 points) Find the area under the curve

   $$y = \frac{1}{x^2 - 6x + 13},$$

   and above the x-axis, if $1 \le x \le 3$.