HOMEWORK 7 - MATH 112
DUE DATE: Monday, March 28
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Find the following integrals using the general power rule for integration:

   (a) $\int \frac{4x+6}{(x^2+3x+7)^3}dx$

   (b) $\int x^2\sqrt{3-x^3}dx$

2. Find the following integrals using formal substitution:

   (a) $\int x^3(1-x^4)^2dx$

   (b) $\int \frac{x^2+1}{\sqrt{x^3+3x+4}}dx$

3. Use the Exponential Rule or the Logarithmic Rule to find the integrals:

   (a) $\int (2x+1)e^{x^2+x}dx$

   (b) $\int 3(x-4)e^{x^2-8x}dx$

   (c) $\int \frac{x^2}{x^3+1}dx$

   (d) $\int \frac{1}{x\ln x}dx$

4. Find the equation of the function $f(x)$, whose derivative is equal to $f'(x) = \frac{x^3-4x^2+3}{x-3}$ and is such that $f(4) = -1$.

5. Sketch the region whose area is represented by the definite integral. Then use a geometric formula to evaluate the integral:

   (a) $\int_0^4 3xdx$

   (b) $\int_{-3}^3 \sqrt{9-x^2}dx$

6. Find the area of the region that is bounded by the graph of the function $f(x) = \frac{2x^2+8}{x}$, the x-axis and the lines $x = 1$ and $x = 3$.

7. Evaluate the definite integrals:

   (a) $\int_0^2 \frac{x}{\sqrt{1+2x^2}}dx$

   (b) $\int_0^1 \frac{e^{-x}}{\sqrt{e^{-x}+1}}dx$

   (c) $\int_0^1 \frac{e^{2x}}{e^{2x}+1}dx$

8. Sketch the region bounded by the graphs of the functions and find the area of the region:

   (a) $y = 4 - x^2, y = x^2$

   (b) $y = xe^{-x^2}, y = -1, x = 0, x = 1$

   (c) $y = \frac{1}{x}, y = -e^{-x}, x = \frac{1}{2}, x = 1$