HOMEWORK 7 - MATH 112
DUE DATE: Monday, March 29
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) $\int (3x^2 \sqrt{x^3 + 1}) dx$

   (b) $\int (4 + \frac{1}{x^2})^5 (\frac{-2}{x^3}) dx$

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

   (d) $\int \frac{x^2}{(x^3 - 1)^2} dx$

   (e) $\int \frac{x^2}{\sqrt{1 - x^3}} dx$

2. Use formal substitution to find the indefinite integrals

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

   (b) $\int t\sqrt{t^2 + 1} dt$

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

3. Use the Exponential and the Log Rules to find the integrals:

   (a) $\int e^{4x} dx$

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

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

   (d) $\int \frac{1}{x - 5} dx$

   (e) $\int \frac{x^2}{3 - x^3} dx$

   (f) $\int \frac{x^2 + 2x + 3}{x^3 + 3x^2 + 9x + 1} dx$

4. Use all your knowledge about indefinite integrals to compute the following integrals:

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

   (b) $\int (5e^{-2x} + 1) dx$

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

   (d) $\int \frac{x^2 + 2x + 5}{x - 1} dx$

5. Evaluate the definite integrals:

   (a) $\int_2^5 (-3x + 4) dx$

(b) $\int_2^2 (x-3)^4 dx$

(c) $\int_0^1 \frac{x-\sqrt{x}}{3} dx$

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

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

(f) $\int_0^3 |2x-3| dx$

(g) $\int_{-4}^4 (4-|x|) dx$

6. Evaluate the definite integral and then sketch the plane region whose area is represented by the integral:

   (a) $\int_0^2 (x+4) dx$

   (b) $\int_0^{\ln 6} \frac{e^x}{2} dx$

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

   (a) $y = x^3 - 2x + 1, y = -2x, x = 1$

   (b) $f(x) = \sqrt{3x} + 1, g(x) = x + 1$

   (c) $y = \frac{e^{1/x}}{x^2}, y = 0, x = 1, x = 3$

   (d) $y = \frac{1}{x}, y = x^3, x = \frac{1}{2}, x = 1$

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

   (a) $f(y) = \sqrt{y}, y = 9, x = 0$

   (b) $f(y) = y^2 + 1, g(y) = 4 - 2y$