HOMEWORK 7 - MATH 112

DUE DATE: Monday, March 27

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 indefinite integral and check your answer by performing the appropriate differentiation:

$$(a)\ \int (x^2-2x+3)dx \quad (b)\ \int (\sqrt{x}+\frac{1}{2\sqrt{x}})dx \quad (c)\ \int \frac{x^2+1}{x^2}dx$$

2. Find the particular solution $y=f(x)$ that satisfies the given differential equation and initial condition:
   (a) $f'(x)=\frac{1}{5}x-2; f(10)=-10$
   (b) $f'(x)=\frac{2-x}{x^3}, x>0; f(2)=\frac{3}{4}$

3. Find a function f that satisfies the given conditions:
   (a) $f'(x)=\frac{6}{x^2}, f(2)=5$
   (b) $f''(x)=x^{-2/3}, f'(8)=6, f(0)=0$

4. Find the indefinite integral and verify your result using differentiation:
   (a) $\int (x^2-1)^3(2x)dx$
   (b) $\int \frac{x^2}{(x^3-1)^2}dx$
   (c) $\int \frac{x^2}{\sqrt{1-x^3}}dx$

5. Use formal substitution to find the indefinite integrals:
   (a) $\int x^2\sqrt[3]{x^3+5}dx$
   (b) $\int \frac{x^2+1}{\sqrt{x^3+3x+4}}dx$
   (c) $\int \sqrt{x}(4-x^{3/2})^2dx$

6. Find the equation of the function f whose graph passes through the point $(0,\frac{7}{3})$ and whose derivative is $f'(x)=x\sqrt{1-x^2}$.

7. Use the exponential rules to find the following indefinite integrals:
   (a) $\int e^{4x}dx$
   (b) $\int 5x^2e^{x^3}dx$
   (c) $\int 3(x-4)e^{x^2-8x}dx$

8. Use the logarithmic rules to find the following indefinite integrals:
   (a) $\int \frac{1}{5x-6}dx$
   (b) $\int \frac{x^2}{x^3+5}dx$
   (c) $\int \frac{1}{x\ln x}dx$