## HOMEWORK 7 - MATH 112 DUE DATE: Monday, November 19 INSTRUCTOR: George Voutsadakis

Read each problem **very carefully** before starting to solve it. Four out of the eight problems will be chosen at random and graded. Each problem graded is worth 3 points. It is necessary to show **all** 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) 
$$\int (x^2 - 2x + 3)dx$$
 (b)  $\int (\sqrt{x} + \frac{1}{2\sqrt{x}})dx$  (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)  $\int \sqrt{x} (4 - x^{3/2})^2 dx$ 

- 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)  $\int 5x^2 e^{x^3} dx$   
(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)  $\int \frac{1}{x \ln x} dx$