Math 203   Final Exam
Dr. Hossam Yamani   Summer 2005
Name:
Do each of the following problems. Show all your work. No work shown. No Credit.

GOOD LUCK

1. (Please answer on page 1 of the booklet)
Solve the given system of equations using <u>Gauss-Jordan elimination method</u> only (8 pts)

$$\begin{cases} -2x_1 + x_2 + 3x_3 = -7 \\ x_1 - 4x_2 + 2x_3 = 0 \\ x_1 - 3x_2 + x_3 = 1 \end{cases}$$

2. (Please answer on page 2 of the booklet)
Determine the domain and Range of the given function: (8 pts)
$$y = f(x) = \frac{1}{\sqrt{-x^2 + 7}}$$

3. (Please answer on page 3 of the booklet)
Determine the composite function $f \circ g = f(g(x))$ and its domain where
$$f(x) = \frac{1}{\sqrt{x^2 - 2}} \qquad g(x) = \sqrt{5 - x} \qquad \text{(8 pts)}$$

4. (Please answer on page 4 and use the graph paper of the booklet)
Sketch each of the following functions: (3 pts each)
$$f(x) = -x^2 + 4x - 5$$
$$g(x) = -x^3 + x^2 + x - 1$$
$$h(x) = e^x + 1$$

5. (Please answer on page 5 of the booklet)
Solve for x: (8 pts)
$$\frac{e^x + 10 e^{-x}}{7} = 1$$

6. (Please answer on page 6 of the booklet)
Solve for x, check your answer: (8 pts)
$$log_{10}(x + 3) + log_{10} x = 1$$

7. (Please answer on page 7 of the booklet)
Determine the following limits if they exist, Explain: (5 pts each)

a. $\displaystyle \lim_{x \to 0} \frac{\sqrt{x+2} - \sqrt{2}}{x}$

b. $\displaystyle \lim_{x \to 0} \frac{x}{|x|}$

8. (Please answer on page 8 of the booklet)
Determine if the given function is continuous at $x = 1$ or not. Justify your answer. (8 pts)

$$f(x) = \begin{cases} 2x^2 & if \ x \leq 1 \\ x+1 & if \ x > 1 \end{cases}$$

9. (Please answer on page 9 of the booklet)
Determine all vertical and horizontal asymptotes if any of: (8 pts)

$$f(x) = \frac{2x^2 - 5}{x + 2x^2}$$

10. (Please answer on page 10 of the booklet)
Find the derivative of $f(x) = x^2 + 2x + 1$ <u>using the limit approach</u> only. (8 pts)

11. (Please answer on page 11 of the booklet)
The curve $y = ax^2 + bx + c$ passes through the point (1,2) and is tangent to the line $y = x$ at the origin. Find a, b, and c. (8 pts)

12. (Please answer on pages 12, 13, and 14 of the booklet)
For each of the following functions find the first derivative: (3 pts each)

$$g(x) = \frac{3x - 5}{2x + 1}$$

$$h(x) = (\ln x + 1)^2 (e^{2x} - x^2)$$

$$k(x) = \ln\left(\frac{x-2}{x+2}\right)^3$$