V1

1	2	3	4	5	6

Last Name:________________

First Name:________________

ID:________________ Section:____

Math 1271 Midterm #3. April 18, 2003

Attention! Please, note that this is the closed book test. You are not allowed to use graphing calculator. Simple calculators are allowed. Please, show all important steps in you solution but do not make your solution excessively long.

1a. (5pt) The function $f(x) = \dfrac{1}{x+1}$ has

- ☐ an oblique asymptote $y = x$;
- ☐ a horizontal asymptote $y = 1$;
- ☐ an oblique asymptote $y = 1/x$;
- ☐ a horizontal asymptote $y = 0$;
- ☐ an oblique asymptote $y = 3x + 1$.

1b. (5pt) Let $f(x) \to 0$ and $g(x) \to \infty$ as $x \to a$. When exists, $\lim_{x\to a}[f(x)g(x)]$ is equal to

- ☐ $\lim\limits_{x\to a}[-f^2(x)\dfrac{g'(x)}{f'(x)}]$;
- ☐ $\lim\limits_{x\to a}[\dfrac{1}{f^2(x)}f'(x)g'(x)]$;
- ☐ $\lim\limits_{x\to a}[f'(x)g'(x)]$;
- ☐ $\lim\limits_{x\to a}[f(x)g(x)]'$;
- ☐ $\lim\limits_{x\to a}[\dfrac{1}{f'(x)g'(x)}g(x)f(x)]$;.

1c. (5pt) The antiderivative of $f(x) = \sin^2 x \cos x$ is

- ☐ $2\sin^2 x$;
- ☐ $\sin^2 x \cos x + x$;
- ☐ $\dfrac{1}{3}\cos^3 x + C$;
- ☐ $\dfrac{1}{3}\sin^3 x + C$;
- ☐ none of the above.

1d. (5pt) Which definite integral is expressed by the following limit

$$\lim_{n\to\infty} \sum_{i=1}^{n} 5\sqrt{x_i^*}\cos(x_i^*)\Delta x, \qquad \Delta x = 4/n, \quad \text{on the interval} \quad [1,5].$$

- ☐ $\int_1^5 \sqrt{x}\cos x\,\mathrm{d}x$;
- ☐ $\int_2^3 \sqrt{x^5}\tan x\,\mathrm{d}x$;
- ☐ $\int_2^4 5\sqrt{x}\cos x\,\mathrm{d}x$;
- ☐ $\int_1^5 \sqrt{x^3}\sin x\,\mathrm{d}x$;
- ☐ $\int_1^5 5\sqrt{x}\cos x\,\mathrm{d}x$.

2. (15pt) Evaluate the limit

$$\lim_{x \to 0} \frac{\mathrm{e}^{3x} - \mathrm{e}^{2x}}{x}.$$

3. (15pt) Find the most general antiderivative to the function

$$f(x) = \frac{1}{\sqrt{x}} - \frac{1}{\sqrt{1-x^2}}.$$

4. (35pt) Sketch the graph of the function

$$f(x) = \frac{2}{\sqrt{x}} + x.$$

5. (15pt) Evaluate integral by interpreting it in terms of areas

$$\int_{-1}^{1} |x| \, \mathrm{d}x$$