MA 126-6A Spring 2003 Test 1
Name ----------------------------------

1. (a) Use a limit of Riemann sums to evaluate

$$\int_{-2}^{4} (x - x^2)dx.$$

(b) Determine the value of

$$\lim_{n \to \infty} \sum_{j=1}^{n} \cos\left(1 + \frac{j}{n}\right)\frac{1}{n}.$$

2. Determine all intervals on which the graph of

$$g(x) = \int_{1}^{x} \frac{1}{3t^2 - 3t - 11}dt$$

is concave up, and all intervals on which the graph of $g(x)$ is concave down.

3. Evaluate

$$\int_{0}^{4} \frac{1 + x^2}{1 + x}dx.$$

4. Let $v(t) = (2 - t)e^t$ be the velocity at time t of an object moving along a line. The velocity is in feet per second.

(a) Find the displacement of the object from $t = 0$ to $t = 3$.

(b) Find the total distance traveled by the object from $t = 0$ to $t = 3$.

Reference formulas:

$$\sum_{j=1}^{n} j = \frac{1}{2}n(n + 1), \sum_{j=1}^{n} j^2 = \frac{1}{6}n(n + 1)(2n + 1),$$

$$\sum_{j=1}^{n} j^3 = \frac{1}{4}n^2(n + 1)^2,$$

$$\sum_{j=1}^{n} j^4 = \frac{1}{30}n(n + 1)(2n + 1)(3n^2 + 3n - 1).$$