Calculus I, Quiz 5, 4/12/7    Name:

Question 1
Consider the integral $\int_1^6 x^2 \, dx$.
With five equal intervals, find the following estimates of the integral:

- The left Riemann sum $L$
- The right Riemann sum $R$
- The midpoint Riemann sum $M$
- The upper Riemann sum $U$
- The lower Riemann sum $L$
- The trapezoidal rule $T$

Also sketch the relevant rectangles and trapezoids for these various sums on a graph of the function $y = x^2$ and explain from the geometry how these sums relate to the true value of the integral. Also determine the integral exactly and comment on the accuracy of the various estimates.

Question 2
Find the following indefinite integrals:

- $\int \left( 5x^4 - 4x^{-3} + 4x^{\frac{4}{3}} \right) \, dx$
- $\int \left( e^{3x} + \sin(2x) - \cos(4x) + \frac{3}{x} \right) \, dx$

Question 3
Find the following definite integrals and interpret the integrals in terms of areas, with a sketch:

- $\int_0^2 (x^2 - 1) \, dx$
- $\int_0^2 |x^2 - 1| \, dx$