Math 112
Quiz 4
Wednesday, February 13, 2008

The Error Bound Theorem Formulas

- $|I - L_n| \leq \frac{K_1(b-a)^2}{2n}$ and $|I - R_n| \leq \frac{K_1(b-a)^2}{2n}$
- $|I - M_n| \leq \frac{K_2(b-a)^3}{24n^2}$ and $|I - T_n| \leq \frac{K_2(b-a)^3}{12n^2}$

1. Let $I = \int_0^1 \sin(x^2)\,dx$. Explain why the inequalities

$$L_7 \leq I \leq R_4$$

are valid.

2. Find a value of n for which the Error Bound Theorem guarantees that L_n approximates the value of $I = \int_0^1 \sin(x^2)\,dx$ within ± 0.005. Justify your answer. Maple is permitted for this problem (for arithmetic only).

3. Find the area of the region bounded by $y = \sqrt{x}$, $y = 0$, and $x = 4$.

4. Find the length of the curve

$$y = \frac{x^2}{2} - \frac{\ln x}{4}$$

from $x = 3$ to $x = 9$.