3,4,4 = 11 total

MATH 136, Problem Set 7, part 'B' Solutions

7.9 / 41. From the figure, we can take $K_2 = 1$ (1), and then $|f''(x)| \le 1$ all $x \in [0,3]$. Then

$$|\text{Error}(M_{10})| \le \frac{1 \cdot (3-0)^3}{24 \cdot 10^2} \doteq .01125 \quad (1)$$

$$|\text{Error}(T_{10})| \le \frac{1 \cdot (3-0)^3}{12 \cdot 10^2} \doteq .0225 \quad (1)$$

44. From the figure, $K_4 = 12$ (1) and $|f^{(4)}(x)| \le 12$ for all $x \in [0,3]$. So

$$|\text{Error}(S_{10})| \le \frac{12 \cdot (3-0)^5}{180\ 10^4} \doteq .00162 \quad (1)$$

To get $|\text{Error}(S_N)| \le 10^{-6}$, we could take N with

$$\frac{12 \cdot 3^5}{180 \cdot N^4} < 10^{-6}$$

so $$N^4 > \frac{12 \cdot 3^5}{180} \times 10^6$$

$$N > \sqrt[4]{10^6 \cdot \frac{12 \cdot 35}{180}} \doteq 63.4$$

Any even $\boxed{N \ge 64}$ (2) would do.

9.1/46 If $y = e^{ax}$, $y' = ae^{ax}$, $y'' = a^2 e^{ax}$ (2)

then $y'' + 4y' - 12y = 0 \iff e^{ax}(a^2 + 4a - 12) = 0$. (2)

$e^{ax} > 0$ all x, so $a^2 + 4a - 12 = 0$, or $(a+6)(a-2) = 0$ $\boxed{a = -6, 2}$.