Name: Section: 5 6 9 10

1. Use Simpson's Rule with $n = 4$ to approximate the integral $\int_1^5 e^x dx$.

$a=1,\ b=5,\ f(x)=e^x,\ n=4,\ \Delta x = \frac{b-a}{n} = \frac{5-1}{4} = 1.$

x_i	1	2	3	4	5
$y_i = f(x_i)$	e^1	e^2	e^3	e^4	e^5
S_n coeff's	1	4	2	4	1
$y_i \cdot$ coeff's	e^1	$4\cdot e^2$	$2\cdot e^3$	$4\cdot e^4$	e^5

$$Sum = e + 4e^2 + 2e^3 + 4e^4 + e^5$$

$$\Longrightarrow S_4 = \frac{\Delta x}{3} \cdot Sum = \frac{1}{3}\left(e + 4e^2 + 2e^3 + 4e^4 + e^5\right)$$

2. Suppose f is a continuous functions defined on $[1, 3]$, and suppose

$$|f''(x)| \le 17 \quad \text{for} \quad 1 \le x \le 3.$$

How large should n be for T_n to be within 10^{-5} of $\int_1^3 f(x)dx$.

$K = 17.$ We want

$$|E_T| \le \frac{17\cdot(3-1)^3}{12\cdot n^2} \le 10^{-5}$$

$$\frac{17\cdot 2^3}{12\cdot 10^{-5}} \le n^2$$

$$\Longrightarrow \sqrt{\frac{17\cdot 2^3}{12}\cdot 10^5} \le n. \text{ works.}$$