

CSC/MAT 335 - EXAM 3
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Name _____ **Section** _____

This test is administered under the auspices of the Mercer University Honor Code.

Some Potentially Useful Equations

$$N_1(h) = \frac{1}{2h} [f(x_0 + h) - f(x_0 - h)] \qquad N_j(h) = N_{j-1} \left(\frac{h}{2} \right) + \frac{N_{j-1}(h/2) - N_{j-1}(h)}{4^{j-1} - 1}$$

$$\int_{x_0}^{x_1} f(x)dx = \frac{h}{2} [f(x_0) + f(x_1)] - \frac{h^3}{12} f''(\xi) \qquad \int_{x_{-1}}^{x_1} f(x)dx = 2hf(x_0) + \frac{h^3}{3} f''(\xi)$$

$$\int_{x_0}^{x_2} f(x)dx = \frac{h}{3} [f(x_0) + 4f(x_1) + f(x_2)] - \frac{h^5}{90} f^{(4)}(\xi) \qquad \int_{x_{-1}}^{x_2} f(x)dx = \frac{3h}{2} [f(x_0) + f(x_1)] + \frac{3h^3}{4} f''(\xi)$$

$$\int_{x_0}^{x_3} f(x)dx = \frac{3h}{8} [f(x_0) + 3f(x_1) + 3f(x_2) + f(x_3)] - \frac{3h^5}{80} f^{(4)}(\xi)$$

$$\int_{x_0}^{x_4} f(x)dx = \frac{2h}{45} [7f(x_0) + 32f(x_1) + 12f(x_2) + 32f(x_3) + 7f(x_4)] - \frac{8h^7}{945} f^{(6)}(\xi)$$

$$\int_{x_{-1}}^{x_3} f(x)dx = \frac{4h}{3} [2f(x_0) - f(x_1) + 2f(x_2)] + \frac{14h^5}{45} f^{(4)}(\xi)$$

$$\int_{x_{-1}}^{x_4} f(x)dx = \frac{5h}{24} [11f(x_0) + f(x_1) + f(x_2) + 11f(x_3)] + \frac{95h^5}{144} f^{(4)}(\xi)$$

$$\int_a^b f(x)dx = \frac{h}{2} \left[f(a) + 2 \sum_{j=1}^{n-1} f(x_j) + f(b) \right] - \frac{b-a}{12} h^2 f''(\mu)$$

$$\int_a^b f(x)dx = \frac{h}{3} \left[f(a) + 2 \sum_{j=1}^{(n/2)-1} f(x_{2j}) + 4 \sum_{j=1}^{n/2} f(x_{2j-1}) + f(b) \right] - \frac{b-a}{180} h^4 f^{(4)}(\mu)$$

$$\int_a^b f(x)dx = \int_{-1}^1 f \left(\frac{(b-a)t + (b+a)}{2} \right) \frac{(b-a)}{2} dt \qquad \int_{-1}^1 f(x)dx = \sum_{i=1}^n w_i f(x_i)$$

$$\int_0^\infty e^{-x} f(x)dx = \sum_{i=1}^n w_i f(x_i) \qquad \int_{-\infty}^\infty e^{-x^2} f(x)dx = \sum_{i=1}^n w_i f(x_i)$$

$$w_{i+1} = w_i + \frac{1}{6} (k_1 + 2k_2 + 2k_3 + k_4)$$

$$k_1 = hf(t_i, w_i) \qquad k_2 = hf \left(t_i + \frac{h}{2}, w_i + \frac{1}{2}k_1 \right)$$

$$k_3 = hf \left(t_i + \frac{h}{2}, w_i + \frac{1}{2}k_2 \right) \qquad k_4 = hf(t_{i+1}, w_i + k_3)$$