

§ 10.10 APPLICATIONS OF TAYLOR SERIES

ONLY

EVALUATING NON-ELEMENTARY INTEGRALS

(NUMERICAL INT
FOR DEFINITE INT)

$$\int f(x) dx = ?$$

ex. USE TAYLOR SERIES TO EVALUATE

$$\int \sin(x^2) dx$$

$$\text{RECALL: } \sin(x) = x - \frac{1}{3!}x^3 + \frac{1}{5!}x^5 - \frac{1}{7!}x^7 + \dots$$

(CONVERGES FOR ALL x)

$$\sin(x^2) = (x^2) - \frac{1}{3!}(x^2)^3 + \frac{1}{5!}(x^2)^5 - \frac{1}{7!}(x^2)^7 + \dots$$

(CONVERGES FOR ALL x)

$$\int \sin(x^2) dx = \int x^2 - \frac{1}{3!}x^6 + \frac{1}{5!}x^{10} - \frac{1}{7!}x^{14} + \dots dx$$

$$= C + \frac{1}{3}x^3 - \frac{1}{3! \cdot 7}x^7 + \frac{1}{5! \cdot 11}x^{11} - \frac{1}{7! \cdot 15}x^{15} + \dots$$

CONVERGES FOR ALL x .