Homework 1

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1   Problem 1

Approximating calculate $\int_0^1 e^{-x^2} dx = 0.747......$

Using the Talor series to extend:

$\int_0^1 e^{-x^2} dx = \int_0^1 (1 - x^2 + \frac{x^4}{2} - \frac{x^6}{3} + \frac{x^8}{4})$

$= 1 - \frac{1}{3} + \frac{1}{2!} \times \frac{1}{5} - \frac{1}{3!} \times \frac{1}{7} + \frac{1}{4!} \times \frac{1}{9} - \frac{1}{5!} \times \frac{1}{11} + R_6$

The remainder is: $R_6 = \frac{1}{6!} \times \frac{1}{13} - \frac{1}{7!} \times \frac{1}{15} + ...$

Find the truncation error and roundoff error to get the total error.