

Assignment 11 - Extra Problems

1. Use the 5th degree Maclaurin polynomial for $f(x) = e^x$ and Taylor's theorem to obtain the estimate

$$\frac{1957}{720} \leq e \leq \frac{1956}{719}$$

2. For what values of x do the following polynomials approximate $\sin x$ to within 0.01

$$(a) P_1(x) = x \quad (b) P_3(x) = x - x^3/6 \quad (c) P_5(x) = x - x^3/6 + x^5/120$$

3. How accurately does $1 + x + x^2/2$ approximate e^x for $x \in [-1, 1]$? Can you find a polynomial that approximates e^x to within 0.001 on this interval?

4. Evaluate

$$\int_0^1 e^{-x^2} dx$$

to within 0.001.

5. Find the sum of these series

$$(a) \sum_{n=0}^{\infty} (-1)^n \frac{x^{4n}}{n!} \quad (b) \sum_{n=0}^{\infty} (-1)^n \frac{\pi^{2n}}{6^{2n}(2n)!} \quad (c) \sum_{n=0}^{\infty} \frac{x^n}{2^n(n+1)!}$$