1. Page 681 exercises 37 and 38

37. How close is the approximation \( \sin x = x \) when \( |x| \leq 10^{-3} \)? For which of these values of \( x \) is \( x < \sin x \)?

38. The estimate \( \sqrt{1 + x} = 1 + (x/2) \) is used when \( x \) is small. Estimate the error when \( |x| \leq 0.01 \).

2. Page 691 exercises 38 and 40

38. Use series to evaluate the limit

\[
\lim_{t \to 0} \frac{1 - \cos t - (t^2/2)}{t^4}
\]

noindent

40. Use series to evaluate the limit

\[
\lim_{y \to 0} \frac{\tan^{-1} y - \sin y}{y^3 \cos y}
\]

3. Page 691 exercise 49

49. Derive the series

\[
\tan^{-1} x = \frac{\pi}{2} - \frac{1}{x} + \frac{1}{3x^3} - \frac{1}{5x^5} + \cdots \quad x > 1
\]

\[
\tan^{-1} x = -\frac{\pi}{2} - \frac{1}{x} + \frac{1}{3x^3} - \frac{1}{5x^5} + \cdots \quad x < -1
\]

4. Page 708 exercises 36 and 38

36. Does the series converge, converge conditionally or diverge? Give reasons for your answers

\[
\sum_{n=1}^{\infty} \frac{(-1)^n (n^2 + 1)}{2n^2 + n - 1}
\]

38. The same question as the above one

\[
\sum_{n=1}^{\infty} \frac{2^n 3^n}{n^n}
\]
5. Page 709 exercise 61 and 64
61). Find the Maclaurin series of $\cos\left(\frac{x^5}{2}\right)$
64). Find the Maclaurin series of $e^{-x^2}$
6. Page 710 exercise 105, 106
105). If $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ are convergent series of nonnegative numbers, can anything be said about $\sum_{n=1}^{\infty} a_n b_n$? Give reasons for your answer.
106). If $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ are divergent series of nonnegative numbers, can anything be said about $\sum_{n=1}^{\infty} a_n b_n$? Give reasons for your answer.
7. Page 711 exercise 107, 108
107. Prove that the sequence $\{x_n\}$ and the series $\sum_{k=1}^{\infty} (x_{k+1} - x_k)$ both converge or both diverge.
108. Prove that $\sum_{n=1}^{\infty} \left(\frac{a_n}{1+a_n}\right)$ converges if $a_n > 0$ for all $n$ and $\sum_{n=1}^{\infty} a_n$ converges.