MATH 152, Fall 2019

Worksheet 10

1. Find the third Taylor polynomial for $f(x) = \tan^{-1} x$ at $x = 1$.

2. Find the Maclaurin series for $f(x) = xe^x$. Express your answer in sigma notation.

3. Compute the Maclaurin polynomial of degree 4 for the function $f(x) = \cos(x)\ln(1-x)$ for $-1 < x < 1$.

4. Use a series to approximate the definite integral to within the indicated accuracy

$$\int_0^{1/2} x^2 e^{-x^2}\, dx; \quad (|error| < 0.001)$$

5. Find the sum of the series

   a) $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n+1}}{4^{2n+1}(2n+1)!}$

   b) $\displaystyle 3 + \frac{9}{2!} + \frac{27}{3!} + \frac{81}{4!} + \cdots$

6. Use series to evaluate the limit

$$\lim_{x \to 0} \frac{x^3 - 3x + 3\tan^{-1}(x)}{x^5}$$