

**Homework due Week 11, day 3** (use your own paper)

Name : \_\_\_\_\_

1. Find the Maclaurin series for  $f$  using the definition. Verify your answer with Table 1 and Wolfram|Alpha.

a.  $f(x) = \frac{1}{1-x}$

b.  $f(x) = \ln(1+x)$

c.  $f(x) = 2^x$

2. Find the Taylor series for  $f(x)$  centered at  $x = a$ .

a.  $f(x) = x^4 - 3x^2 + 1$  and  $a = 1$

b.  $f(x) = \sqrt{x}$  and  $a = 16$ . Hint: See Example 8 on page 766. See also:

[overleaf.com/read/krtzsqqgykktb](https://overleaf.com/read/krtzsqqgykktb)

3. The Maclaurin series for  $\arctan x$  is  $\sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1}$  for  $-1 < x < 1$ .

a. Determine the Maclaurin series for  $x^3 \arctan x$ .

b. Determine the Maclaurin series for  $\int x^3 \arctan x \, dx$ . (Hint: use term-by-term integration, Sec 11.9).

c. Determine a series that represents  $\int_0^{0.1} x^3 \arctan x \, dx$ . (Hint: follow Example 11b pg 769).

d. If the first two non-zero terms of the series are used to estimate the value of the definite integral from the previous part, provide a bound on the error of this estimate. (Hint: follow Example 11b pg 769).