

MAPLE PROJECT 4
Due May 1, 2006

1. Let $x_0 = 1$ and consider the sequence x_n given by the formula

$$x_n = \frac{x_{n-1}}{2} + \frac{1}{x_{n-1}} \quad n = 1, 2, 3, \dots$$

Use Maple software to compute the first 15 terms of the sequence and make a conjecture about the limit of the sequence.

Extra Credit: Prove your conjecture.

problem 2. Power series approximation

- (a) Find the power series representation centered at 0 for the function

$$f(x) = \frac{\ln(x^2 + 1)}{x^2}$$

- (b) Graph f and the eight-degree Taylor polynomial $P_8(x)$ for f on the same coordinate system.
(c) Consider $F(x)$ and $G(x)$ defined below:

$$F(x) = \int_0^x \frac{\ln(t^2 + 1)}{t^2} dt \quad \text{and} \quad G(x) = \int_0^x P_8(t) dt$$

Evaluate $F(.25)$, $F(.5)$, $G(.25)$, $G(.5)$, and describe the relationship between these values.