

Numerical Analysis Maple Project 2
Due September 23, 2002

Instructions: Use a word processor to create a text file with the Maple procedures described below. All procedures should use type checking. Read the file into Maple and test each procedure with the values stated below. Turn in the following:

- 1). A hard copy showing only your reading in the text file and testing the procedures.
 - 2). An email message with your text file attached so that I can test your procedures.
1. Write a Maple procedure implementing the Bisection Method (according to Algorithm 2.1 on page 49 of the text) with the relative error stopping criterion (2.2) to estimate $\sqrt[4]{17}$. Your procedure should allow for the following inputs:

endpoints a and b
tolerance TOL
maximum number of iterations N

At each iteration, your procedure should display the number of iterations so far, the current interval containing the root and the current estimate of $\sqrt[4]{17}$. Test your procedure using the initial interval $[2, 3]$, a tolerance of 10^{-4} , and a maximum of 25 iterations. Use the following skeleton code to start your procedure:

```
bisect := proc(a::numeric, b::numeric, TOL::numeric,  
N::posint)  
  local FA, FP, i, p;  
  include your code here  
end:
```

2. Let $g(x) = 3 - 2 \cos\left(\frac{x}{5}\right)$.
- a. Show that the hypotheses of Theorem 2.2 apply to g on the interval $[0.5, 1.5]$ and, hence, that g has a unique fixed point p on that interval.
 - b. How many iterations of g are required to estimate p with an absolute error less than 10^{-4} ?
 - c. Following Algorithm 2.2 on page 59 of the text, write a Maple procedure to estimate p . Test your procedure using $p_0 = 1$, $TOL = 10^{-5}$, and $N_0 = 25$.

Note: I expect you to work alone on this assignment. If you need help, please talk to <i>me</i> .
