

Read BF Chapter 2.1,2.2

## Exercises

**Chapter 2.1** # 7,15

**Chapter 2.2** # 1,2,8,11a,16,17,19

## MATLAB/Octave

1. The Lambert W function is the function  $y = W(x)$  so that  $W(x)e^{W(x)} = x$ . Write a function `wbisect(x)` that computes  $W(x)$  using the bisection method for any  $x > 0$ . (If you want to check your work, matlab has the function `lambertw` built in.)
2. Consider the function  $f(x) = \sin(2\pi x) + e^{-x}$ . Suppose we are interested in locating the zero of this function near  $x = 0.5$  using functional iteration of  $g(x) = x + f(x)$ .
  - (a) Print of graph of  $g(x)$  on the interval  $0 \leq x \leq 3$ . Use  $x_0 = 0.5$  and draw on your graph the functional iteration  $x_{n+1} = g(x_n)$  three times. Does it look like the resulting sequence will converge? If so, will it converge to the root near  $x = 0.5$ ?
  - (b) Notice that  $f(x)$  has the same zeros as  $cf(x)$  for any constant  $c \neq 0$ . Find the root near  $x = 0.5$  using functional iteration with an appropriate choice of  $c$ .