Defining, Evaluating and Plotting Functions[1]

1. At the prompt type: `syms x` and then press ⏎Enter .
   Now type `f = sin(x)` and then press ⏎Enter .

2. Type (at the prompt and then press ⏎Enter):
   ```
   subs(f, 2)
   subs(f, '2')
   double(ans)
   ```
   Which of the above answers are numerical and which are symbolic? (You may want to type:
    `help subs` and `help double` for explanations)

3. Enter: `ezplot(f)`

4. Following the example above, define and plot the function $g(x) = exp(x)$ by typing:
   ```
   syms x
   g = exp(x)
   ezplot(g)
   ```
   Then adjust the domain in the plot by typing: `ezplot(g,[-2,2])`

5. Enter: `ezplot(x^2)`

6. Plot the function $\sqrt{x^2 - .00001}$ by typing: `ezplot(sqrt(x^2 - .00001))`.
   Plot the function $x^7 - x$ by typing: `ezplot(x^7 - x)`.
   Because of the domain chosen by the computer, important features of the graphs are missing.
   What are they? Try adjusting the domains until these features are shown.

7. Plot the function $sin(x^5)$ by typing: `ezplot(sin(x^5))`. A computer plots a function
   by locating a finite number of points and "connecting the dots". How does this go wrong for
   $sin(x^5)$?

8. Prepare a brief (< 2 page) written report describing what happened, answering all the ques-
   tions and sketching the plots. Use complete sentences and standard mathematical notation.

These exercises introduce basic commands for defining and plotting functions. They con-
sider the difference between numerical and symbolic evaluation of a function and the pro-
cesses by which the software makes plots. They address issues of scale and the effects of
rapid oscillation on plotting.