**ENEL101**

**Problem set 7**

**Symbolic Math**

**Important Notes:**

* This assignment is about using Matlab symbolic math. The questions are based on content from chapter 11 of the textbook “Matlab, An introduction with applications”.
* The function files will be tested by the auto-tester using randomly generated data.
* Do NOT put any plots in your answer.
* Unlike the other assignments, a passing grade on this assignment is 75%.

**Make sure your final submission runs without syntax error.** As usual, template files that do not run without syntax error will be rejected by the auto-marker, and you will have to visit Chris in person to demo your code and get the marks.

**Q1.** Using Matlab symbolic math and the int() function, write a function to find the actual answer to Question 7 from Assignment 6. Hint 1): you cannot type

syms Sigma Epsilon Z r

inside a function but you can type

eqn=sym('Sigma\*Z/4/Epsilon\*(Z^2 + r^2)^(-3/2)\*2\*r');

which automatically creates those symbolic variables but you have to refer to them in quotes e.g. ‘Sigma’. Hint 2): as a last step use vpa() to convert your answer to floating point symbolic variable.

**Q2**. Using Matlab symbolic math and the diff()and solve() functions, write a function to find the actual answer to Question 6 from Assignment 6. Same hints as for Question 1 and additionally you will have to convert your numerical answer (which is still a symbolic variable even after using vpa) to type double using double()before you can do certain Matlab vector operations.

**Q3.** Write a function that finds the equation of the tangent line to the upper part of the ellipse (x on horizontal axis, y on vertical axis)

at The answer will be a symbolic math expression of the form

where and have numerical values and is a symbolic variable. Hint: first solve for using solve(), select the that is the top part of the ellipse, then use diff() to take the derivative with respect to then get the slope by substituting in using subs(), and then calculate the y-intercept As the very last step you can use vpa() to turn all numerical values in the symbolic answer (i.e. and ) into floating point symbolic numbers in order to compare your answer to the solution set. Note that *x* and *y* are declared as symbolic variables in test\_assign7.m and provided as inputs to the function so you don’t put them in quotes.

**Q4.** The current in a series RLC circuit can be described the differential equation

Using dsolve(), find the solution given initial conditions , , and parameters Use variable current in the code instead of i to avoid conflicts with i as a numerical counter (note current has been declared as a sym and supplied to the function so you don’t have to put it in quotes).