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Department of Mathematical Sciences
Math 353 Engineering Mathematics III
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Homework 3

Download, print and read Introduction to MATLAB by exercises - Braun, (Chapters 8, 9 and 11) from the class home-page.

I) For the next four items record a diary file showing your MATLAB work. Include the functions written by you.

1. Write a function file named **myquad.m** which has as input the coefficients a, b, c and outputs the roots x_1, x_2 of the quadratic equation $ax^2 + bx + c = 0$. Apply your new function to solve $3x^2 - 123454321x + 2 = 0$ and $3x^2 + 123454321x + 2 = 0$. Check if the solutions x_1, x_2 given by **myquad.m** satisfy $x_1x_2 = 2/3$ (use **format long**). If not, please modify your function until $x_1x_2 = 2/3$. Check your result also using the MATLAB function **roots**.
2. Write a function file named **sum2.m** which has as input a positive integer n and outputs two numbers S_1, S_2 , where $S_1 = \sum_{k=1}^n k$ and $S_2 = \sum_{k=1}^n \frac{1}{k^3}$. Find $\sum_{k=1}^{2009} \frac{1}{k^3}$. Use *format long e* to show the result.
3. Write a script file named **meps** which finds the machine epsilon (see Section 11.4 Braun). Type `>> meps`. You should get the same result if you type `>> eps(1)`. What does the MATLAB function **eps** do? Hint: type `>> help eps`
4. Use the example given in Section 11.5.2 (Braun) to write a function file which has as input an integer number n (of pens) and outputs the price of n pens or a message if $n < 0$.

II)

1. Section 1.2, Problem 16 (page 44).
2. Use the intermediate value theorem to find an interval of length one that contains the root of $\ln x + x^2 = 3$. Use the bisection method, and one of the available MATLAB implementations of it, to find the root to eight correct decimal places. Write the MATLAB commands used to find the root.
3. Can fixed point iteration be used to find the fixed points of $g(x) = x^2 + x - 4$?
4. Use **fpi.m** to find a fixed point of $g(x) = 0.5(x^2 - \sin(x + 0.15))$ Use the graphs g and $y = x$ to find a good initial guess $= x_0$. (Write the MATLAB commands used to find the fixed point). Why is the FPI method convergent in this case?