

Homework 2, Math 451, Spring 2013

due Wednesday, January 30th

This home covers material from Sections 2.1-2.4 of Mathews and Fink.

- Book problems

- Section 2.1, problem 1
- Section 2.1, problem 2
- Section 2.1, problems 5
- Section 2.4, problems 1
- Section 2.4, problems 3

- Non-book problems

1. Use the bisection algorithm to find the values of x in the interval $(-\pi, \pi)$ where the function

$$f(x) = \sin\left(x + \frac{\text{sign}(\cos(10x))}{2}\right) - \frac{4}{10}$$

crosses $f(x) = 0$. In this case, we will count jumps as crossings. Your solutions should be accurate to 6 decimal places. (Note that neither fixed-point iteration or Newton--Raphson can solve this problem, as stated.)

2. Consider the equation

$$e^{rx} = x^2.$$

Fill in the blanks:

In this equation, there may be as few as _____ solutions, or as many as _____ solutions, depending on the value of r . If $|r| > ______$, then there are _____ solutions. Solutions are found in the interval(s) _____.

If $|r| < ______$, then there are _____ solutions. Solutions are found in the interval(s) _____. In between these two cases, there are _____ solutions, which are _____.

Now, explain how you determined your answers.