

Due on 12/02/05

- (1) Textbook problem 8.1
- (2) Textbook problem 8.2
- (3) In a certain micro-controller based system, you are to develop a program that generates a 60Hz sinusoidal waveform. Assume the micro-controller system, is capable of evaluating your algorithm at 1kHz. Write a program in Matlab to simulate your algorithm. Your program should iterate a 2nd order difference equation to generate the desired 60Hz sinusoidal waveform (in discrete time, of course). You should not use any math function other than the basic +, -, *, and / operations.

Note that when you are actually implementing this on the actual micro-controller hardware, there is a slight modification that you will have to make to your algorithm. The coefficients you use will be of limited numeral precision (integer or floats only have so much precision) and so your oscillator will begin to drift given enough time. This is analogous to what we saw in lab 4 where we could not exactly place the poles on the $j\omega$ -axis, though in this case we cannot place the poles exactly on the unit-circle. Just as in lab 4 where we added a non-linearity, when you actually implement this on the hardware you typically add a “slight” non-linearity such as clipping the waveform.