Homework 6

ME 240: Fundamentals of Instrumentation & Measurement

D. H. Kelley and I. Mohammad • 20 points

1. (10 points) Using computational software, generate 128 values of the function $f(t) = 5\sin 10\pi t + 3\cos 40\pi t$ (where t is in seconds) between $t = 0$ and $t = 1$ s. Then perform an FFT on the results and find the magnitude of the coefficients (as produced by the FFT; they will be complex). Plot the results versus frequency in a bar chart. Write a sentence in which you interpret the peaks observed. *Hint: Section A.2 in the Wheeler text may help. Alternately, consider using the* `fft` *command in Matlab.*

2. (10 points) Using computational software, generate 128 values of the function $f(t) = 7.5\sin^2 10\pi t$ (where t is in seconds) between $t = 0$ and $t = 2$ s. Then perform an FFT on the results and find the magnitude of the coefficients (as produced by the FFT; they will be complex). Plot the results versus frequency in a bar chart. What is the meaning of the coefficient at $f = 0$? *Hint: Section A.2 in the Wheeler text may help. Alternately, consider using the* `fft` *command in Matlab.*