

## EE-3032, HW-6

### *Fourier Series*

Problems from the Chaparro text:

- 5.7 (p. 385)
  - In part (a) simplify your answer so that the result is clearly real (the FT must be real since the original signal is both real and even).
  - Use Table 5.2 to check that your answers to the preamble (before (a)), (b), and (c) are correct.
- 5.10, part (a) only
  - In deriving  $X(\Omega)$  you will need to simplify by placing terms over a common denominator.
  - $u(t)$  is still the unit step here, but it is defined differently than we are used to.
  - Verify your result for  $U(\Omega)$  using Table 5.2.
- 5.11, part (a)(i) and part (b).
  - In part (a)(i), the time-domain sketch gets complicated due to the frequencies involved. I recommend you use graphing software (MATLAB, Excel, Wolfram Alpha, ...) for this part. Note that the low frequency  $\cos(t)$  message signal acts as an “envelope” around the other signal (the carrier). Both signals are on  $[-1,1]$ . So, you can sketch the envelope or outer bound of the signal as  $\cos(t)$  and  $-\cos(t)$  and then draw the product signal  $y(t)$  inside this envelope.
  - In part (b), note that the given signal is an energy (not power) signal and therefore you should find the energy. The given expression is actually correct for energy even though it is labeled as power.