1. P-13.2

2. P-13.4 Do parts *a* and *c* by hand. Do all via MATLAB. Justify MATLAB's answer to *d* using the Fourier transform properties you know. Based on your answer, define a signal $x_4[n]$ whose fft is `[0 0 0 10 0 0 0 0 0 0]`.

3. P-13.8 Plot the spectrogram in MATLAB to verify your answer.

4. For an N-point DFT, where N is even, show that $X\left[\frac{N}{2}\right]$ is always a *real* number if x[n] is real.

MATLAB hints:

```
fs = 8000;              % Set the sampling rate
tt = 0:1/fs:1.2;        % Set the time vector

xx1 = cos(2*pi*600*tt) .* (tt<0.5);     % Turn on cosine for 0.5 seconds
xx2 = cos(2*pi*500*tt) .* (tt>0.4);

specgram(xx1+xx2, 256, fs)   % Do a spectrogram with 256 point ffts.
```