Homework 5: ECE 4370

1) How many turns of a helical antenna are required to achieve a peak gain of 13 dBi, given standard construction parameters of 1-wavelength circumference and a 13-degree pitch angle? What is the half-power beamwidth for such an antenna? (5 points)

2) Radiation of a 2-wavelength, center-fed, square loop antenna lying in the xy-plane (15 points):

   a) Using our standard assumptions for current waveforms on wire antennas, sketch the current distribution (phase/amplitude). What polarization and peak gain directions would you expect from this antenna?

   b) Using your knowledge of dipole antennas and array theory, plot the azimuth-cut and elevation-cut of directivity for this antenna from analytical expressions.

   c) Confirm your answer in (b) using NEC.