## EE 483/583 Antennas for Wireless Communications (Spring 2025) Homework 13 (<u>Optional</u> Extra Credit) Friday, May 2, 2025

- 1) 6.4 Hint: Start with forms similar to equations (6-2) & (6-7) for the AF, then use Euler's Identity to simplify.
- 2) For the array in 6.4, find: a) location(s) of the maxima  $\theta_m$  (deg), b) the power radiated by the array  $P_{rad}$ , c) a function for the directivity  $D(\theta)$  as well as  $D_{max}$ , and d) the half-power points  $\theta_h$  as well as half-power beamwidth (HPBW) in degrees. These can be found analytically or numerically using MATLAB, MathCad, etcetera. Plot the normalized <u>directivity</u> polar radiation pattern (in dB) in the *x-z* plane. Use a 0 to -40 dB scale with  $\theta = 0$  at the top.
- 3) 6.9 Assume array has 5 elements. In part d), verify using Matlab or MathCad.
- 4) 6.13 In parts c)-d), can verify using Matlab or MathCad.
- 5) 6.20
- 6) 6.26 Use 16 isotropic elements.

## Notes:

- If done, this extra credit opportunity will replace your lowest HW *or* quiz grade that counts (as best advantages your overall grade).
- There will be <u>at least</u> one question dealing with this material on the final exam.

Due Wednesday, May 7, 2025 by 2 pm at my office or department mail box.