

610 Fall 2016 – Homework 5 Due Th 10/20/16

1. (60 points, Foster & Cauer synthesis)
 - a) For the following lossless admittance give the two Foster and the two Cauer realizations.
$$y(s) = \frac{2s(s^2+4)}{(s^2+2)(s^2+6)}$$
 - b) Comment on the differences.
 - c) Sketch $[y(j\omega)]/j$
 - d) Give the dual impedance and its circuit for all of the above cases.
 - e) Give the Richards function using $k=2$ for this admittance. Use the R_y of class.

2. (30 points, reflection coefficient properties)
 - a) Give the scattering matrix (=reflection coefficient), $S(s)$, for the above PR $y(s)$; include R_y .
 - b) Check that $S(s)$ is bounded real.
 - c) Give the poles and zeros of $S(s)$ and compare their locations with those of $y(s)$ and of the Richards' function.

3. (10 points, Hurwitz polynomial)
 - a) Check to see if $P(s) = 2s^6 + 3s^5 + 4s^3 + 4s^2 + 3s + 2$ is Hurwitz
 - b) Check if the truncation after the fifth term of the series expansion of $\exp(s)$ is an Hurwitz polynomial.