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610 Fall 2017 – Homework 6 Due Th 10/19/17 New due date Tu 10/24/17

1. (50 points, Richards' synthesis, continued)
   For the degree three lossless admittance
   $y(s)=(3/2)s(s^2+9)/(s^2+4)$
   a) Compare synthesis using a Richards' function at k=1 and at k=3.
   b) Assume this is an impedance $z(s) = (3/2)s(s^2+9)/(s^2+4)$ and compare its Richards' function synthesis at k=1 with that of y(s)

2. (25 points, indefinite Y for BJT)
   For the grounded emitter transistor the admittance matrix is

$$Y(s) := \begin{bmatrix} g\pi + s\cdot(C\pi + C\mu) & -s\cdot C\mu \\ -s\cdot C\mu + gm & go + s\cdot C\mu \end{bmatrix}$$

   a) Give the Indefinite Yind(s) and draw the 3-terminal circuit with currents and voltages labelled as the BJT terminals, b,e,c.
   b) Ground the base terminal and give the admittance matrix with veb=v1, vcb=v2 and ie=i1, ic=i2. Draw the resulting Pi equivalent circuit.
   c) Find the input admittance when the load admittance, $y_L(s)$, is connected from collector to ground.

3. (25 points, Bott-Duffin synthesis)
   Using the Bott-Duffin method synthesize

   Y(s)=[s2+(1/2)s+(1/4)]/[s2+(1/2)s+1]

{this is the function of example 8.6-1 of page 363 with s→2s }