610 Fall 2009 – Homework 7 Due ~~Th~~ Tu 11/~~05~~ 10/09

1. [100 points] [synthesis via Richards' function]
    a) Use the Richards' function to synthesize the admittance

    $$y(s) = \frac{s(s^2+16)}{(s^2+9)}$$

For this use the gyrator bridged by a capacitor and choose different k (that is k1,k2, and k3) for the three sections. Do there appear to be any advantageous k's?
    b) Identify all k=k1=k2=k3 and comment on the nature of the result.
    c) Repeat part a) on the dual, that is for

    $$z1(s) = \frac{1}{y1(s)} = \frac{s(s^2+16)}{(s^2+9)}$$

    d) Show that for all real & positive a & b there is a real k which is a zero of the even part of

    $$y(s) = \frac{s+a}{s+b}$$

    Use that k to synthesize this y(s). Comment upon the non-lossless nature of the result.