610 Fall 2012 – Homework 5
due Th 10/17/13

1. (25 points) (PR properties)
    a) Prove that a PR function of 1/(a PR function) is PR..
    b) Evaluate y1(1/y2(s)) for the PR functions

$$y1(s) = \frac{3s}{s^2+2} + 5$$

$$y2(s) = \frac{4s}{s^2+1} + 3$$

    c) Synthesize the admittances y1 & y2 of b) and from those synthesize y1(1/y2(s))

2. (25 points) (more PR properties)
    For the admittance

$$y(s) = \frac{s(s^2 + as + b)}{(s^2 + 4)(s + c)}$$

    a) Give conditions on the constants a, b, c such that y(.) is PR. Include the separate
        case of c=0.
    b) Synthesize the PR y(s).
    c) In the case c=0 discuss what will change if one were to synthesize the non-PR
        y(s).

3. (50 points) (Richards' function synthesis)
        a) Synthesize, using the Richards' function and gyrator-C, 2-ports in cascade, the

lossless admittance $y(s) = \frac{2s(s^2+4)}{s^2+2}$. Use k=1 where possible and discuss the effect of

using possibly different k.
        b) Compare with the Cauer and Foster forms.