

Given  $G(s) = \frac{s+5}{s^2+2s+10}$

1) Calculate  $G(t) = \mathcal{L}^{-1}[G(s)]$ . This is the impulse response.

2) Calculate the baseband equivalent model components

i.e.  $G(t) = 2G^c(t) \cos \omega_c t - 2G^s(t) \sin \omega_c t$

Compare answer to part 1)

3) Derive the state space model for  $G(s)$  using

$$x_1 = y$$

$$x_2 = \dot{y}$$

4) Calculate  $x_1(t)$ ,  $x_2(t)$  if input  $u(t) = \text{unit impulse } \delta(t)$

5) With  $u = K y^c \cos \omega_c t$

determine  $K$  so that the system with this feedback is undamped.