Prob 42

% Characteristic eqn for closed loop system

% s^2 + 2s + 25 = 0

w\_n\_old = sqrt(25);

zeta\_old = 2/(2\*w\_n\_old);

os\_pcnt = exp(-zeta\_old\*pi/sqrt(1-zeta\_old^2))\*100;

t\_s = 4/(zeta\_old\*w\_n\_old);

os\_des = 15; % desired overshoot percent

t\_s\_des = 0.5; % desired settling time

zeta = (-log(os\_des/100)) / sqrt(pi^2 + log(os\_des/100)^2);

sigma = 4/t\_s\_des;

w\_n = sigma/zeta;

% T(s) = C(s) / R (s) = (25 \* K\_1) / (s^2 + (2 + 25 \* K\_f) \* s + 25 \* K\_1)

K\_f = (2\*sigma - 2)/ 25;

K\_1 = (w\_n^2)/25;

e\_ss = 1/25/2;

G1\_num = 25\*K\_1;

G1\_den2 = 2 + 25\*K\_f;

e\_ss2 = G1\_num / G1\_den2;

sprintf('G\_1(s) = %1.2f / s (s + %d)',G1\_num, G1\_den2)