ML_13_2_3 to calculate gain, K, for a unity feed-back system

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% Onwubolu, G. C.
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%
% Mechatronics: Principles & Applications Toolbox Version 1.0
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%
% Chapter 13: Steady state error, with K required
%
% Example 13.18    MATLAB's Symbolic Math Toolbox may
% be used conveniently to calculate  the values in a Routh table.
% We now demonstrate the making of a Routh table using the Symbolic Math
Toolbox
% or a problem that requires the epsilon method to complete the table. The
following
% program produces the Routh table for Example 13.6 in the text. Also, for
clarity,
% we convert all rows to symbolic objects, simplify, and pretty print after
forming
% the table. CAUTION: In general, the results of this program are not valid if
an
% entire row is zero as e approaches zero, such as [e 0 0 0]. This case must
be
% handled differently, as discussed in text Section 6.3 in the subsection,
% "Entire Row is Zero."

'Example 13.18'       % Display label.
numgdK=[1 15];               % define numerator
dengdK=poly([0 -10 -12]);    % define denominator
GdK=tf(numgdK, dengdK);       % generate G(s)/K
numgkv=conv([1 0],numgdK);    % define numerator of G(s)/K
dengkv=dengdK;               % define denominator of G(s)/K
GKv=tf(numgkv,dengkv);        % cancel common 's' in numerator
GKv=minreal(GKv);             % cancel common 's' in numerator
KvdK=dcgain(GKv);             % evaluate (Kv/K)=num/denom
ess=0.1                    % display label
K=1/(ess*KvdK)               % solve for K
'check for stability'
T=feedback(K*GdK,1);          % display closed-loop

poles=pole(T)
pause
```