$$\frac{Y(s)}{R(s)} = \frac{K}{(s+2)^2(s+10)+K} = \frac{K}{(s^2+4s+4)(s+10)+K}$$

$$\frac{Y(s)}{R(s)} = \frac{K}{s^3+(4+10)s^2+(40+4)s+(40+K)}$$

Routh Array:

1	44
14	$40+K$
$\frac{616-40-K}{14}$	
$40+K$	

all must be positive

$40+K > 0$

$K > -40$

$\frac{616-40-K}{14} > 0$

$K < 576$