Problem 7.12 of text

\[ J = 0.1, \; H = 0.02, \; D(2) = 1 \]

(a) 
C.E: \[ 1 + K \bar{G}(z) = (z-1)^2 + 0.02(0.5(z+1)), \; K = 0 \]
\[ \implies z^2 + (0.001K-2)z + (0.001K+1) = 0 \]

(b) \[ z = \frac{1 + \frac{w}{1-w/2}}{1-w/2} = \frac{20+w}{20-w} \]
\[ \implies (20+w)^2 + (400-w^2)(0.001K-2) + (20-w)^2(0.001K+1) = 0 \]
\[ \implies 4w^2 - 0.04Kw + 0.08K = 0 \]

\[
\begin{array}{c|cc}
 & 4 & 0.08K \\
W & -0.04K & \implies K < 0 \\
W' & 0.08K & \implies K > 0 \\
\end{array}
\]

\[ \therefore \text{the system is unstable for all values of } K \]

(c) \[ P(1) > 0 \implies 1 + (0.001K-2) + (0.001K+1) > 0 \implies K > 0 \]
\[ P(-1) > 0 \implies 1 - (0.001K-2) + (0.001K+1) > 0 \implies 4 > 0 \]
\[ |a_2| < |a_0| \implies (0.001K+1) < 1 \implies K < 0 \]

\[ \therefore \text{unstable for all } K \]