1. I did this problem in class.
2. Using Mat lab
   \[
   \text{>> rlocus([1 4],[1 2 0])}
   \]
   provides Figure 1.

![Root Locus Plot](image)

**Figure 1.** Root locus plot for problem 2.

Picking the indicated point, \( s = -4 + 2.82i \) (and already knowing the answer is 6), observe

\[
||K|| = \frac{||s + p_1|| ||s + p_2||}{||s + z_1||} = \frac{\sqrt{(4-2)^2 + 2.82^2}\sqrt{4^2 + 2.82^2}}{2.82} = 6,
\]

which is simply measuring the length of the lines in Figure 2.
Figure 2. Magnitude criterion for problem 2.

3. Theodore Roosevelt:

\[ 2003 - \frac{3000000000}{60 \times 60 \times 24 \times 365} = 2003 - 95.13 = 1908. \]