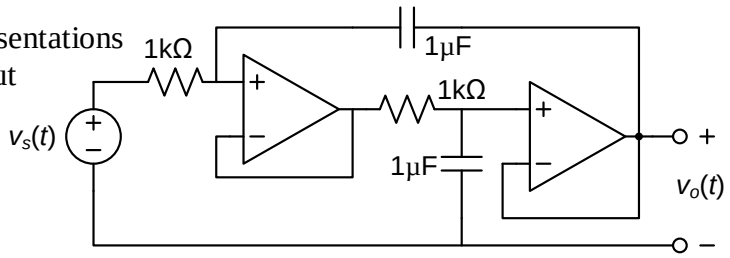
P1 **Concept:** Equivalent system representations

Find: Given the circuit with input $v_s(t)$, output $v_o(t)$ find:
a) transfer function $H(s)$
b) s-plane plot
c) differential equation
d) impulse response $h(t)$



Hints: • It's easier to manipulate C/s than 1000000/s
• The only digits in H(s) are 1, 10^3, and 10^6

Note: This is not "just" a homework problem, but a very real-world lowpass filter

P2 **Concept:** S-Plane representation

Find: Which of the below s-plane system representations are
a) Unstable?
b) Have impulse responses that oscillate?
c) Which could have an impulse response of $h(t) = u(t)$?
d) Two of the impulse responses are $h_1(t) = e^{-t}u(t)$ and $h_2(t) = e^{-3t}u(t)$. Which s-plane plot corresponds to h_1?

Hint: Find the corresponding $H(s)$ for each s-plane first