電路学 NO.5 小考 NO.11.

1. (40%) Consider the network shown in Figure 1(a).

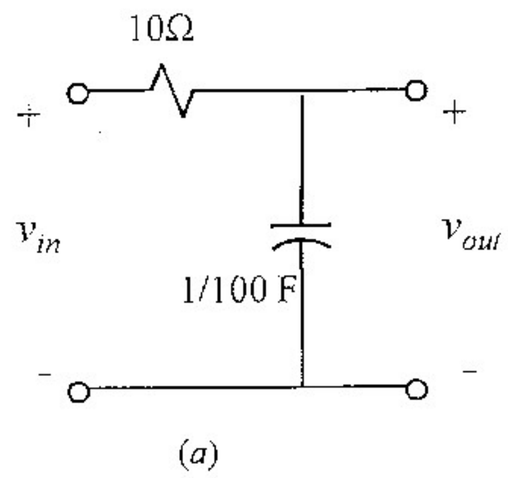
   (a) (10%) Please write the transfer function $H(s)$ from v_{in} to v_{out}. How many zeros and poles does $H(s)$ have?

   (b) (5%) Draw the s-plane diagram of the transfer function. Mark all poles and zeros at their locations on the s-plane.

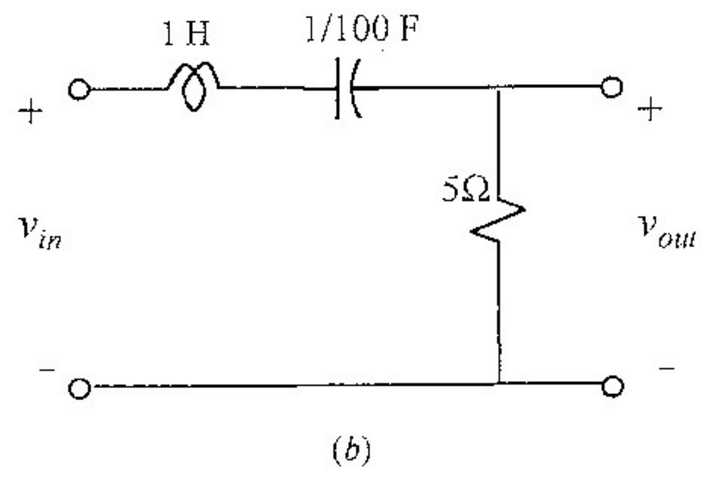
   (c) (10%) Evaluate the network's amplitude ratio $a(\omega) = |H(j\omega)|$ and phase shift $\theta(\omega) = \angle H(j\omega)$ at $\omega = 0^+, 5, 10, 20$ and $\omega = \infty$. Sketch the frequency response curves using these results.

   (d) (5%) What type of filter is this network? (Lowpass, highpass, bandpass, or bandstop) What is the cutoff frequency?

   (e) (10%) Draw the asymptotic Bode plot of the gain and phase for $H(s)$.



(a)



(b)

2. (60%) Consider the network shown in Figure 1(b).

   (a) (10%) Please write the transfer function $H(s)$ from v_{in} to v_{out}. How many zeros and poles does $H(s)$ have?

   (b) (10%) Draw the s-plane diagram of the transfer function. Mark all poles and zeros at their locations on the s-plane.

   (c) (20%) Use the s-plane diagram to evaluate the network's amplitude ratio $a(\omega) = |H(j\omega)|$ and phase shift $\theta(\omega) = \angle H(j\omega)$ at $\omega = 0^+, 5, 10, 20$ and $\omega = \infty$. Sketch the frequency response curves using these results.

   (d) (10%) What type of filter is this network? (Lowpass, highpass, bandpass, or bandstop)

   (e) (10%) Evaluate the quality factor Q. What are the cutoff frequencies?