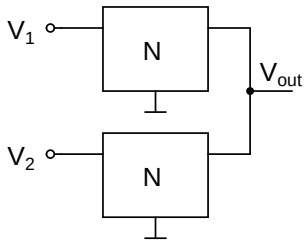

V_1	V_2	V_{out}
1	3	6
4	-4	?
7	-5	?

Figure 1: Figure for Problems 1 and 2

Figure 1 pertains to Questions 1 and 2. The two linear networks (labelled N) are identical, and excited by DC voltage sources V_1 and V_2, as shown in the figure. When $V_1 = 1\,V$ and $V_2 = 3\,V$, V_{out} is found to be $6\,V$.

Q. 1: Determine V_{out} when $V_1 = 4\,V$ and $V_2 = -4\,V$.

Q. 2: Determine V_{out} when $V_1 = 7\,V$ and $V_2 = -5\,V$.

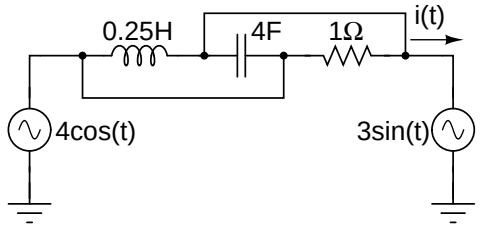

Figure 2: Figure for Question 3

Q. 3: Determine the amplitude of the sinusoidal current i(t).

Q. 4: In Figure 3, the capacitors have initial conditions as shown. $u(t)$ is the unit step function. Determine Vx as a function of time.

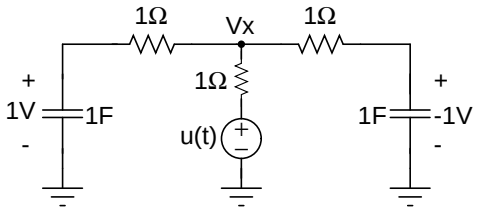

Figure 3: Figure for Question 4

Q. 5: Let H(s) denote the transfer function of the RLC network shown in Figure 4. Determine $H(j1)$.

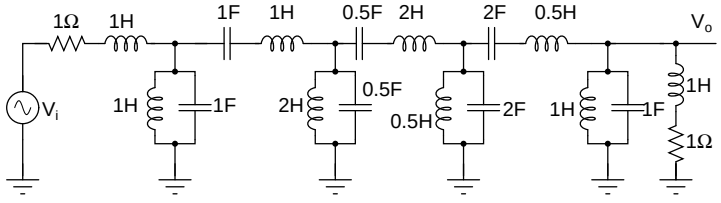

Figure 4: Figure for Question 5

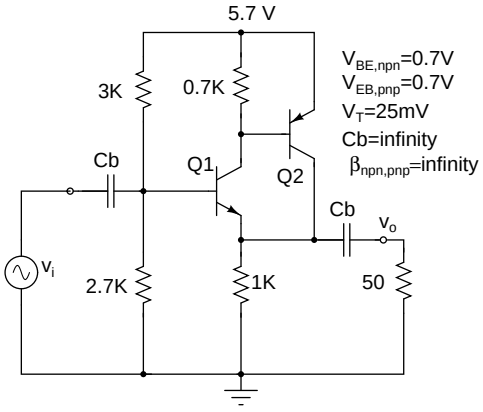

Figure 5: Figure for Questions 6 and 7

Figure 5 pertains to this problem and the next.

Q. 6: Determine the quiescent collector current of the pnp transistor Q2.

Q. 7: Determine the small signal gain v_o/v_i.

Q. 8: In Figure 6, determine the output voltage of the opamp. The diodes have a cut-in voltage of 0.7 V.

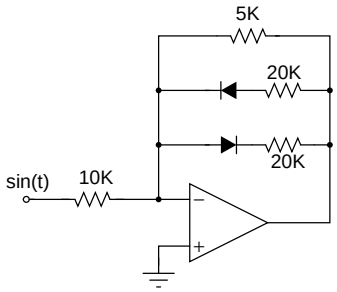

Figure 6: Figure for Question 8

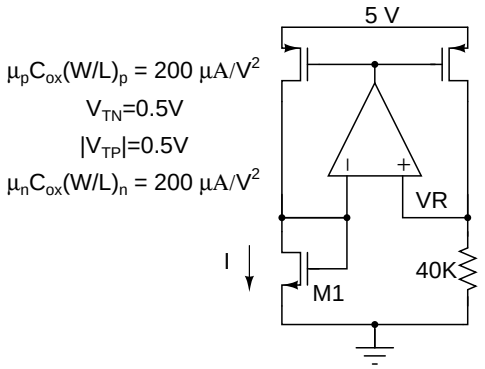

Figure 7: Figure for Questions 9 and 10

Figure 7 pertains to this problem and the next. It is known that a non-zero current flows through the transistors. The opamp is ideal.

Q. 9: Determine the current through M1.

Q. 10: Determine the voltage across the resistor (VR).