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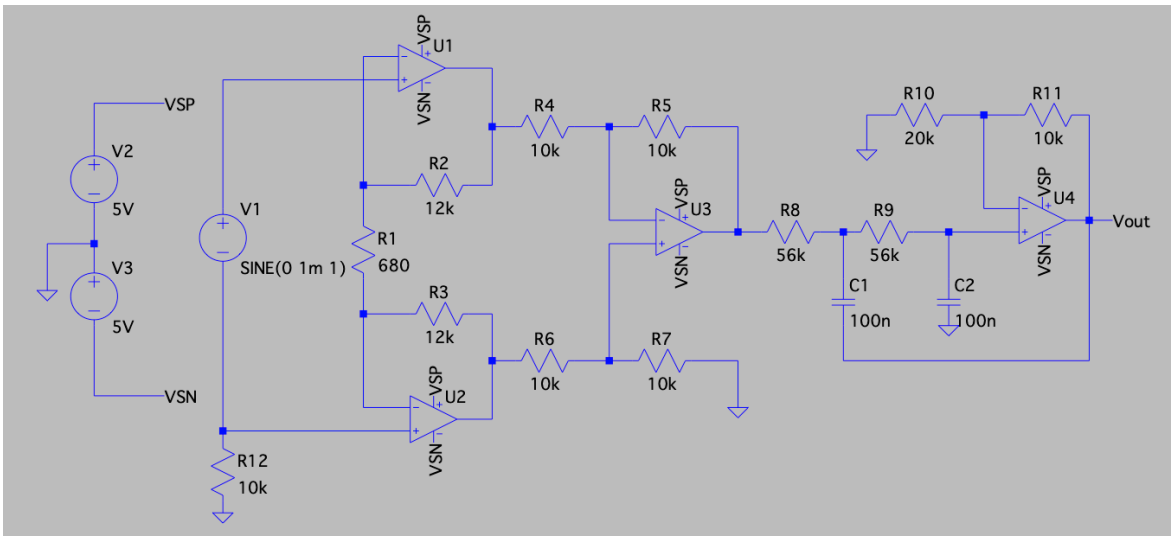
323CAa

Proiect Electronica Analogica
2021-2022

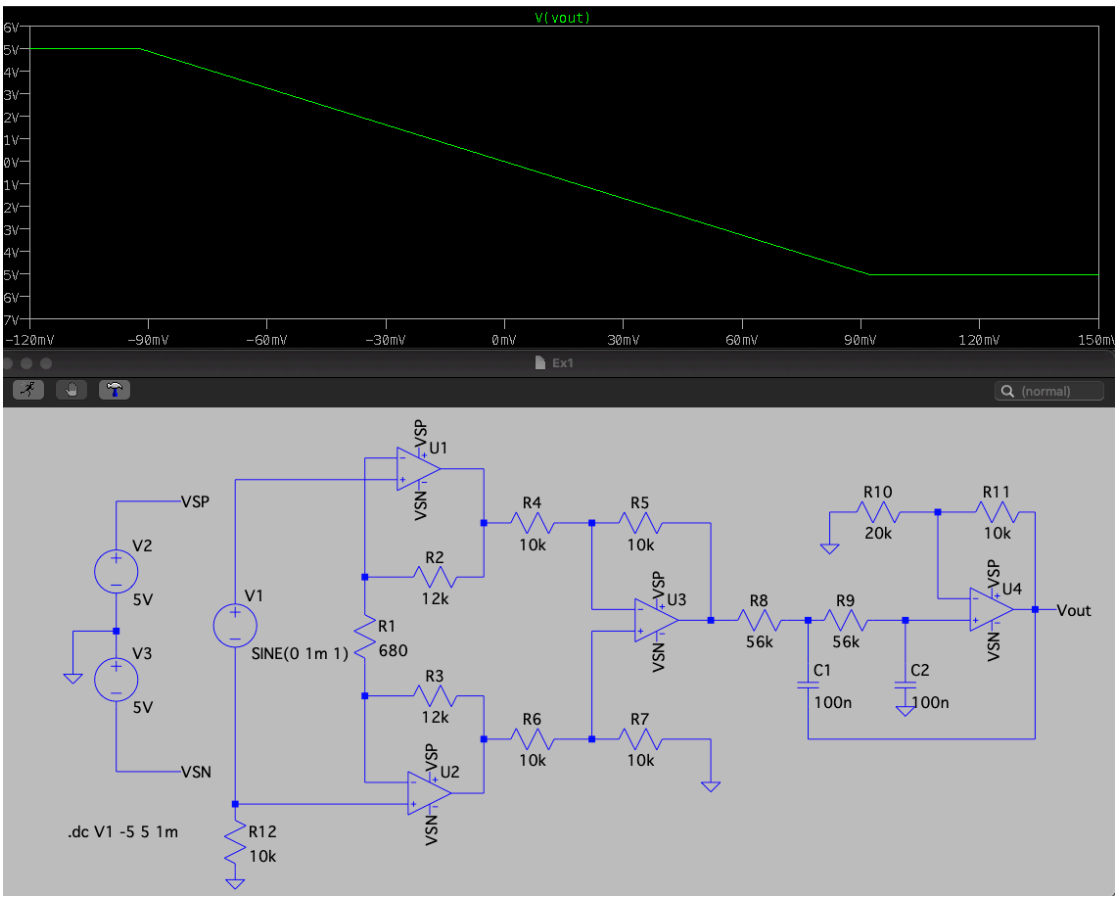
1. Schema propusă cu valorile numerice personalizate

Nume: Girlea => R1 = 680
R8 = R9 = 56k
Prenume: Anana => R2 = R3 = 12k

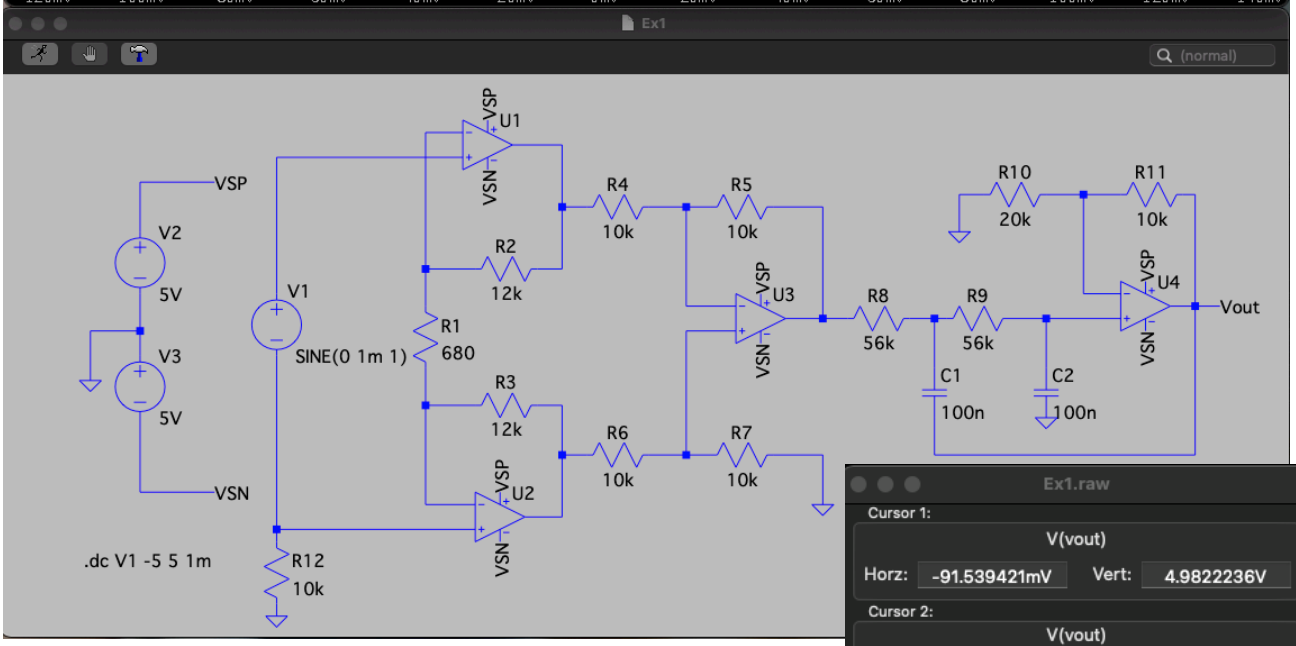


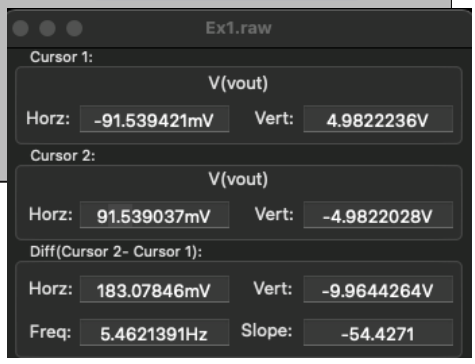
2. Simulare de tip DC Sweep

2.1 Simulare grafic Vout in functie de V1 cu variatie liniara intre -5 V si 5 V cu incrementul 1 mV

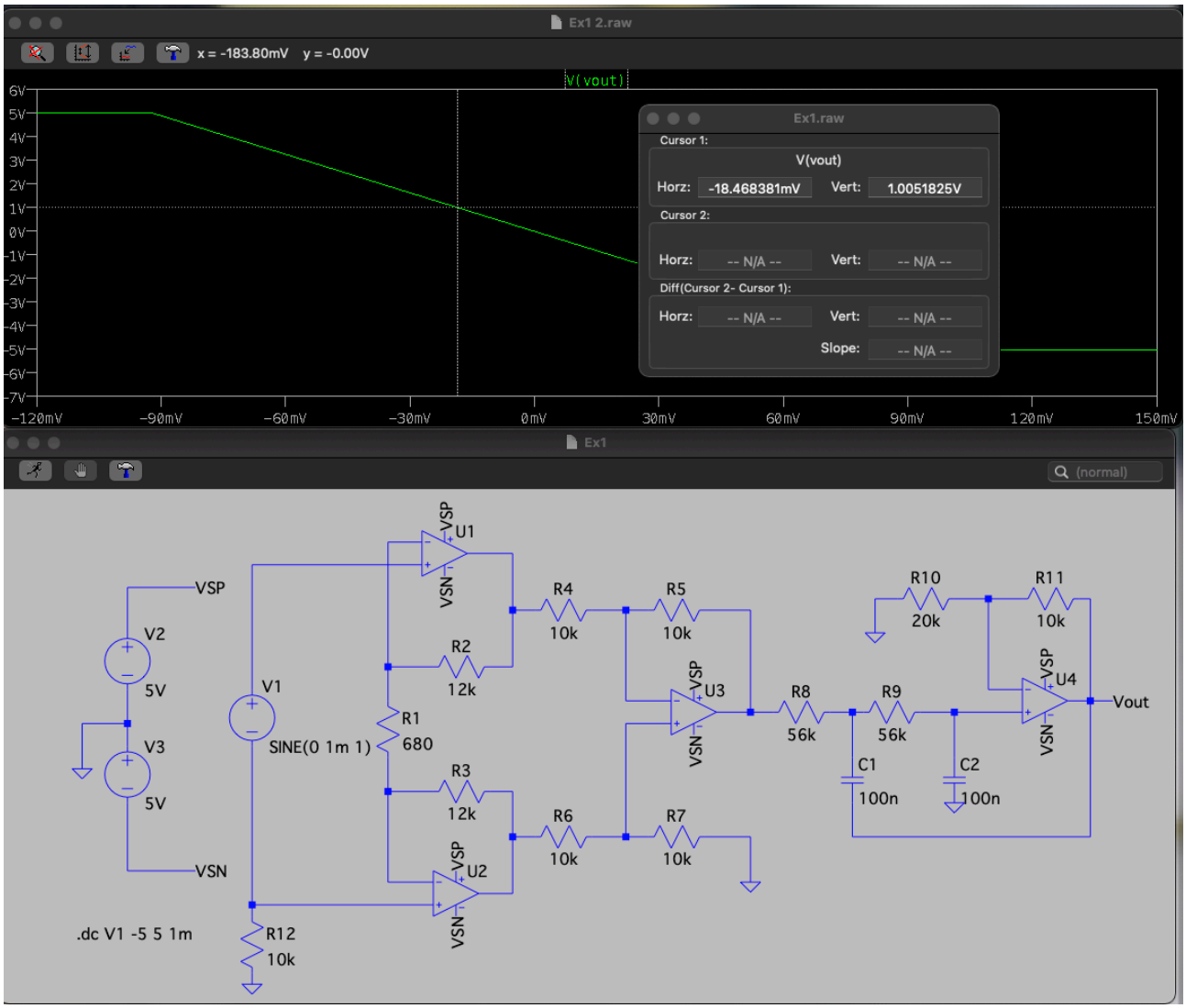


2.2 Domeniul tensiunii de intrare pentru care schema funcționează liniar este (-91.53 , 91.53)





2.3 Amplificarea de tensiune a schemei (pentru semnale foarte lent variabile)



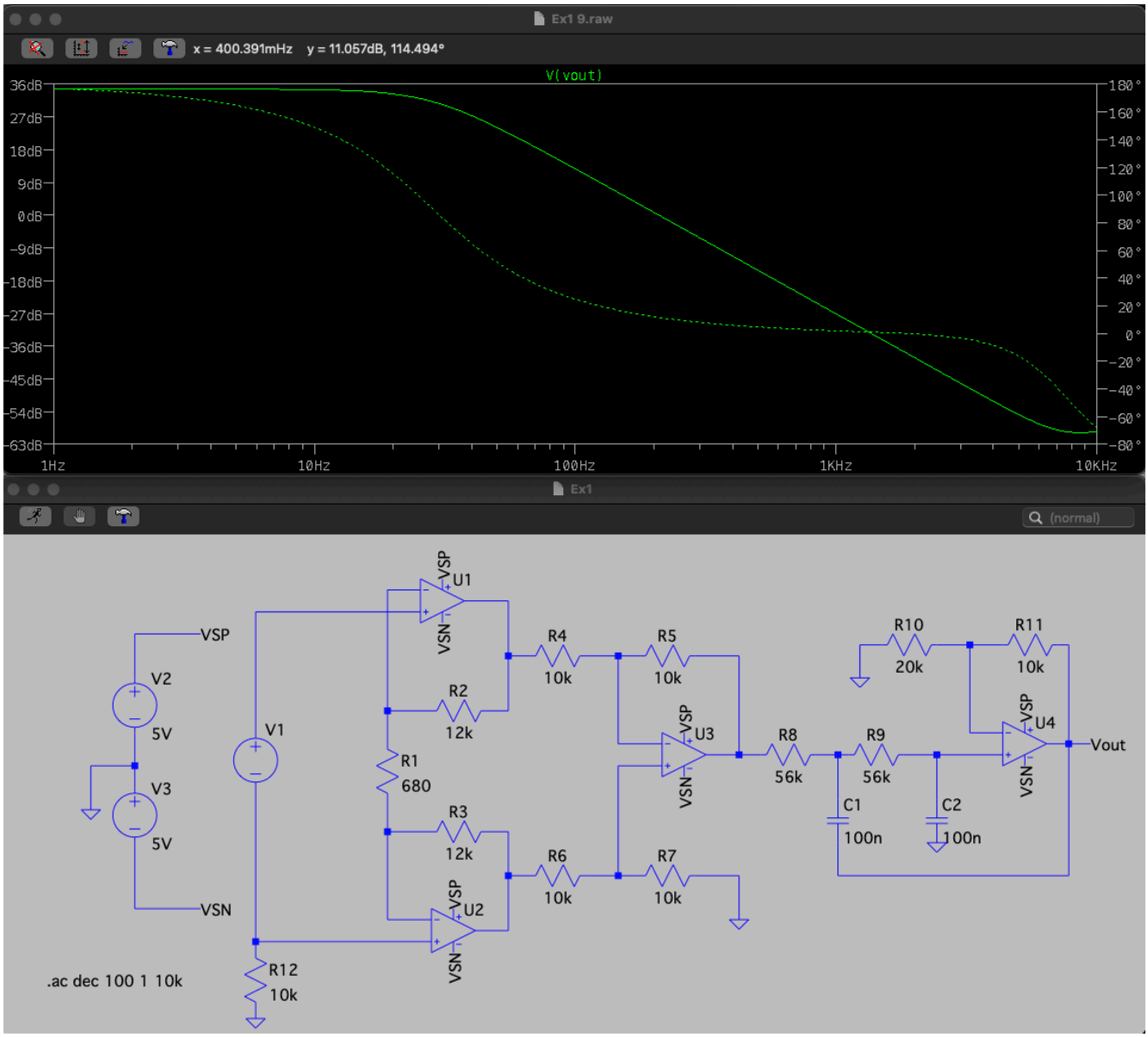
Amplificarea din valorile simulate:

$$A = \frac{\Delta V_o}{\Delta V_i} = \left(1 + \frac{R_2 + R_3}{R_1}\right) \cdot \left(-\frac{R_5}{R_4}\right) \cdot \left(1 + \frac{R_{11}}{R_{10}}\right)$$

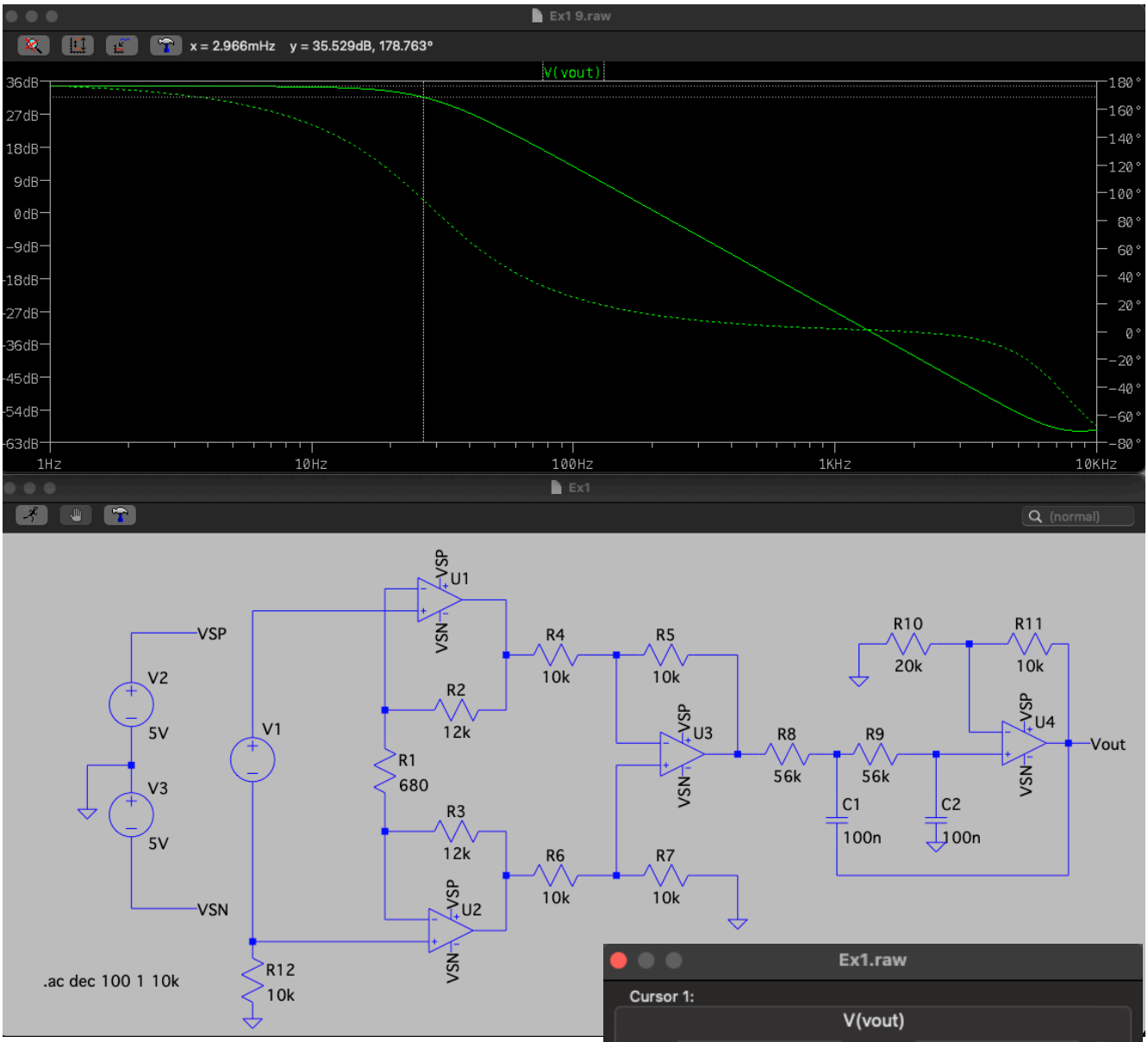
A = (1 + (12k + 12k) / 680) * (-10k / 10k) * (1 + 10k / 20k)
A = (1 + 35.294) * (-1) * (1 + 0.5)
A = 36.294 * (-1) * 1.5
A = 54.441

3. Simulare de tip AC

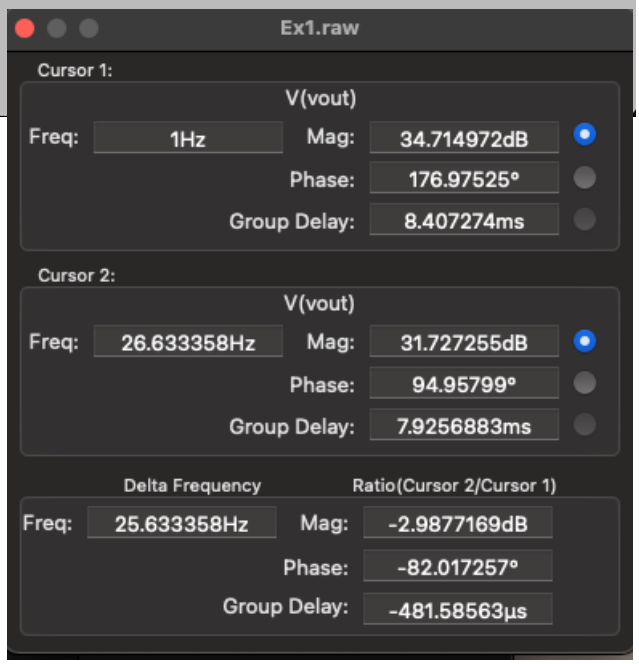
3.1 Caracteristica de frecvență a schemei la scară logaritmică



3.2 Banda de trecere a schemei (egală cu frecvența de -3dB)

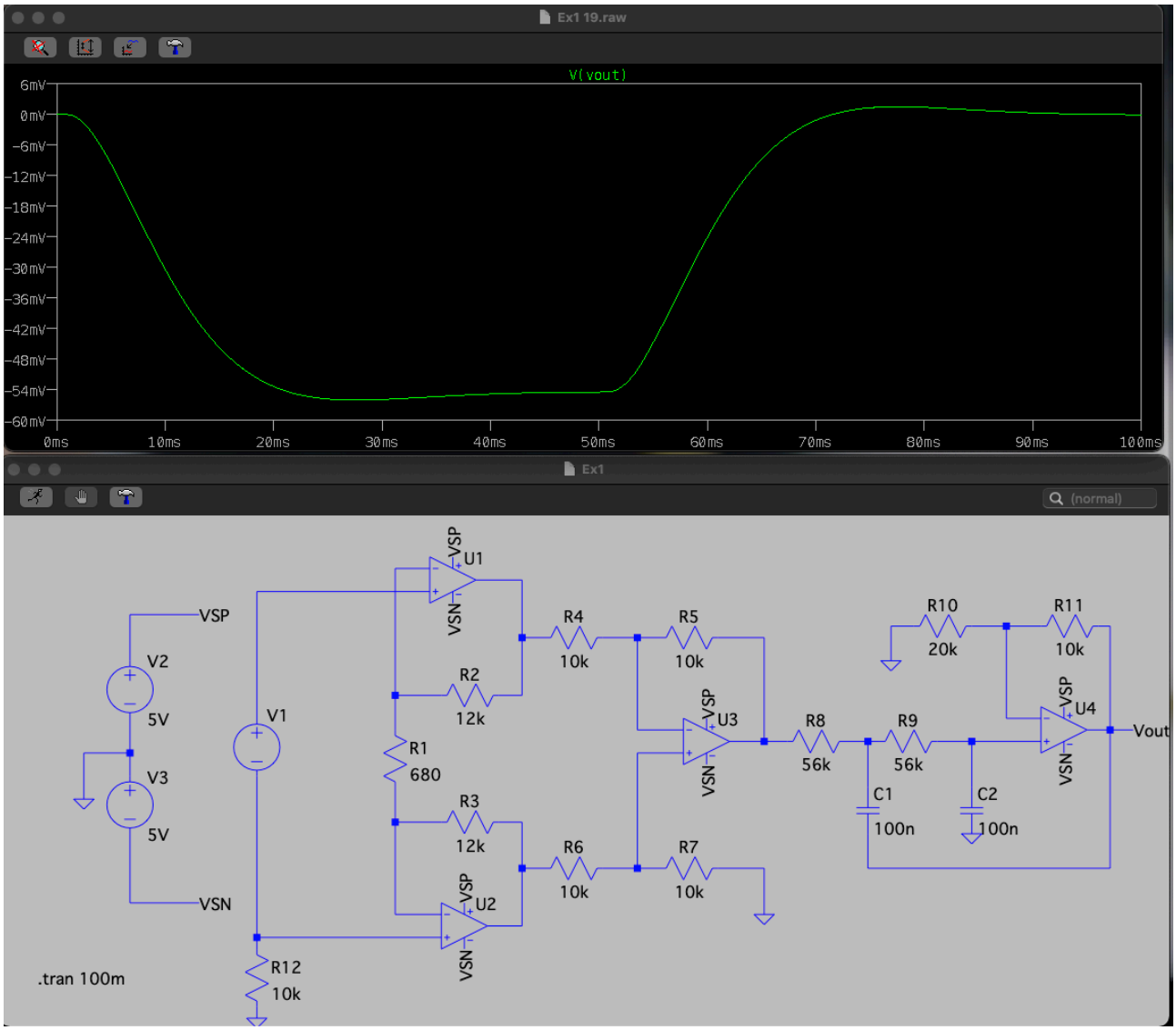


Frecventa de taiere este la 26.63 Hz

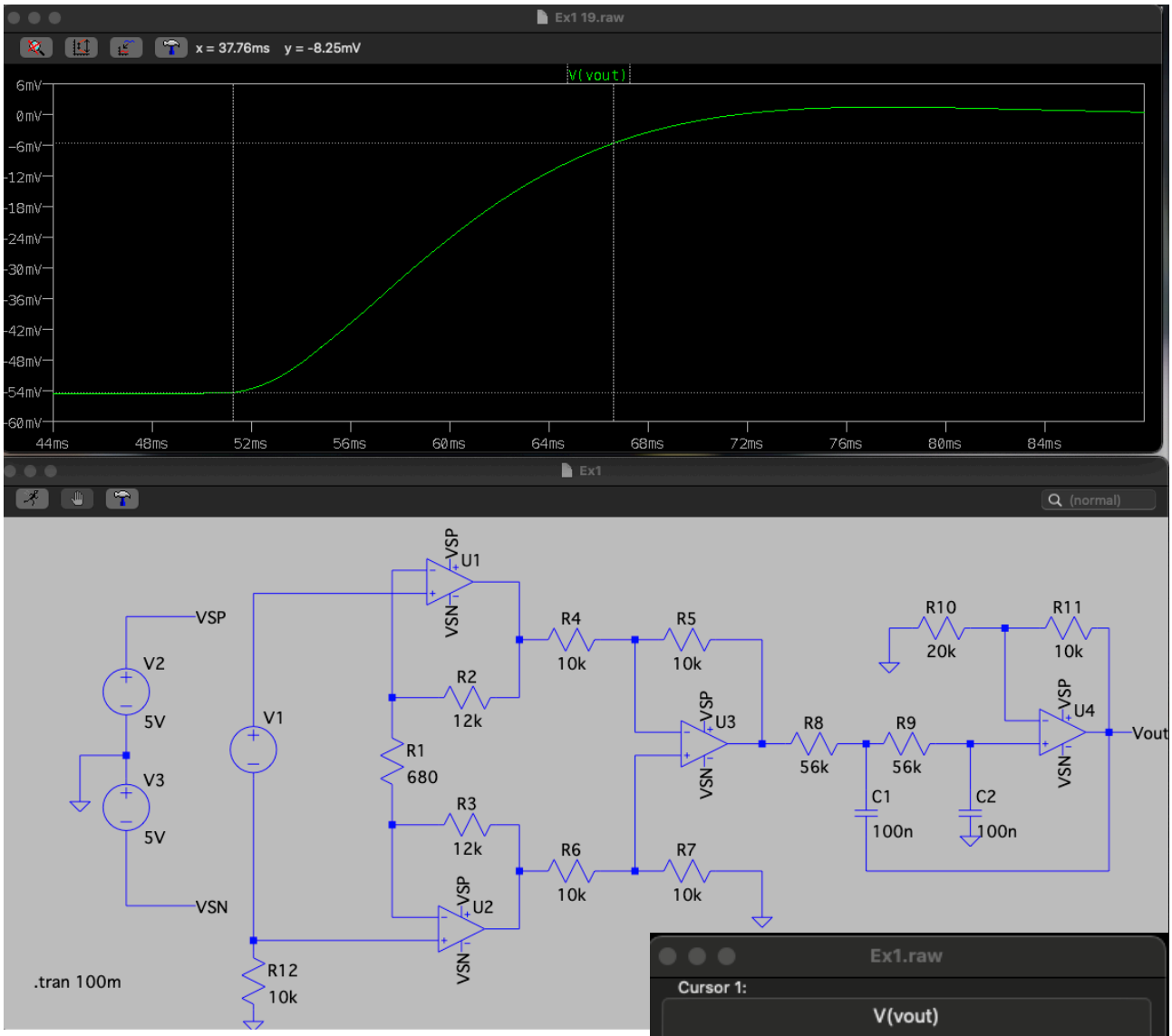


4. Simulare de tip Transient

4.1 Raspunsul la semnal ti p treapta



4.2 Timpul de creștere



Timpul pe crestere: 15.33 ms

5.

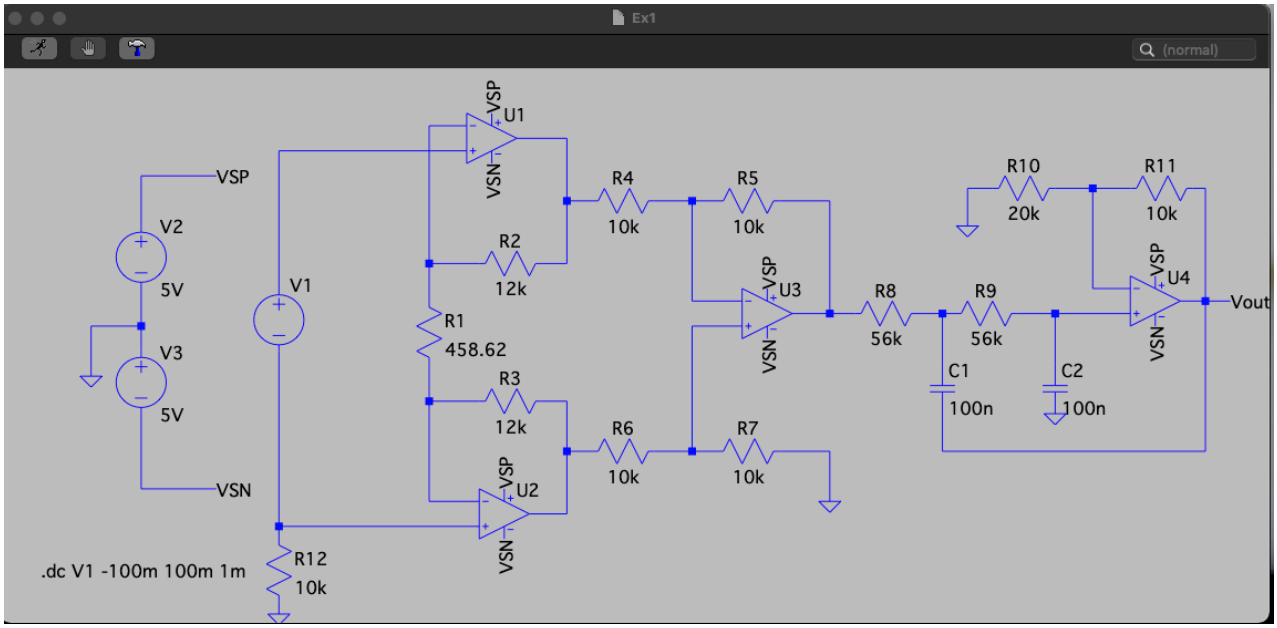
Nume: Girlea => Vim = 25 mV
Prenume: Anana => Vom = 4 V
f-3dB = 100 Hz

5.1 Schema care transfera domeniul de intrare specificat ($-V_{im}$, $+V_{im}$) în domeniul de ieșire specificat ($-V_{om}$, $+V_{om}$).

($-V_{im}$, $+V_{im}$) = (-25 mV, +25 mV) = (-0.025 V, 0.025 V)
($-V_{om}$, $+V_{om}$) = (-4 V, 4 V)

Calculez amplificarea:
A = Vom / Vim = 4 / 0.025 = 160

Calculez R1 din relatia:
(1 + (R2 + R3) / R1) * (-R5 / R4) * (1 + R11 / R10) = A
(1 + (12 + 12) / R1) * (-10 / 10) * (1 + 20 / 10) = 160
(1 + 24 / R1) * (-1) * 3 = 160
1 + 24 / R1 = 53.33
24 / R1 = 52.33
R1 = 24 / 52.33
R1 = 0.45862 kohm = 458.62 ohm



5.2 Schema are frecvența de -3dB

Pulsatia:

$$\frac{1}{\sqrt{R_8 R_9 C_1 C_2}} \sim f$$

Unde R8 = R9 si C1 = C2 => 1 / (R8 * C1) ~ f

Relatia veche:

1 / (56k * 100n) ~ 26.63 Hz

Relatia noua:

1 / (56k * C1nou) ~ 100 Hz

=> C1 nou = C2 nou = 26.63n ~ 27n

Am ales sa rotunjesc C1 nou si C2 nou la 27n care difera fata de valoarea obtinuta (26.63n) cu 1.37%.