1. zadatak

$U = 5{,}40\,V$ $\quad \sigma_V = 0{,}04\,V$ $\quad R = \frac{U}{I}$ $\quad \left(\frac{U}{I}\right)$ → derivacija

$I = 5\,mA$ $\quad \sigma_I = 0{,}01\,mA$

$$\sigma_R^2 = \left(\frac{1}{I}\right)^2 \sigma_V^2 + \left(\frac{U}{I^2}\right)^2 \sigma_I^2 + 2 \cdot r \left(\frac{1}{I}\right)\left(-\frac{U}{I^2}\right) \cdot \sigma_V \cdot \sigma_I$$

$= 73{,}8496$

$\sigma_R = 8{,}6\,\Omega$ $\quad R = \frac{5{,}4\,V}{5\,mA} = 1080\,\Omega$

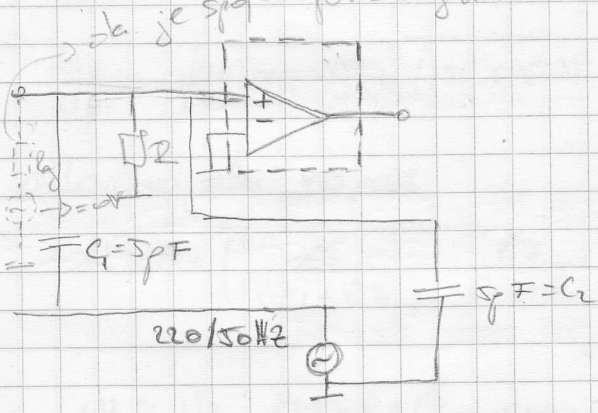
$R = (1080 \pm 8{,}6)\,\Omega$

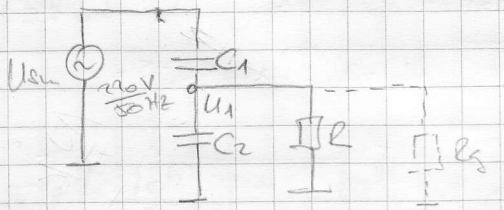
primjer: $z = f(x, y)$ $\quad$ pogreška

$$\sigma_z^2 = \left(\frac{\partial f}{\partial x}\right)^2 \sigma_x^2 + \left(\frac{\partial f}{\partial y}\right)^2 \sigma_y^2 + 2 \cdot r \cdot \frac{\partial^2 f}{\partial x \partial y} \cdot \sigma_x \cdot \sigma_y$$ → ovo znadilo bi za snagu

→ $R = 1.076\,\Omega$ $\quad 1{,}076 \pm (1{,}076 \cdot 0{,}01 + 1 \cdot 2) = (1.076 \pm 0{,}013)\,\Omega$

Zadatak 2.





$$U_1 = \frac{R \,\|\, \frac{1}{j\omega C_2}}{\frac{1}{j\omega C_1} + R \,\|\, \frac{1}{j\omega C_2}} \cdot U_{sv} = \frac{j\omega C_1 R}{1 + j\omega (C_1 + C_2) R} \cdot U_{sv}$$

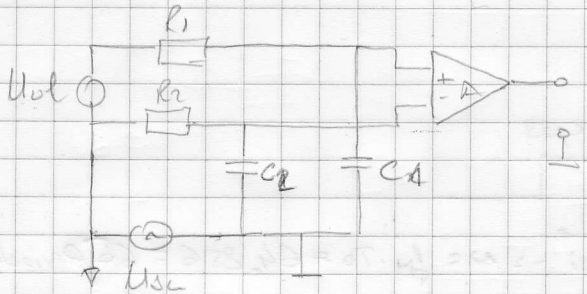
$\omega C_1 R = 0{,}015$

$\omega (C_1 + C_2) R = 0{,}031$

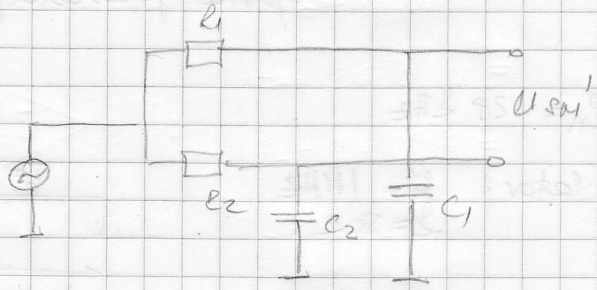
$\approx j\omega C_1 R \cdot U_{sv} = 0{,}015 \cdot 220\,V_{ef} = 3{,}61\,V_{ef}$

isto treba dijeliti sa 2

Zadatak 3.



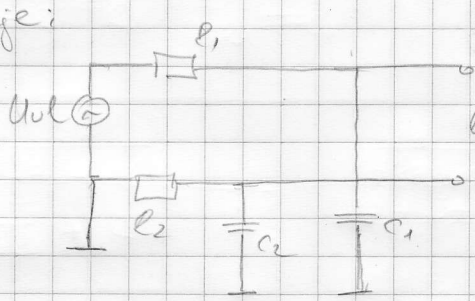
Ul = Zvučno pojačalo



$$X_{C_1} = \frac{1}{j\omega C_1}$$

$$X_{C_2} = \frac{1}{j\omega C_2} \qquad H_{SH} = \frac{U_{sc}'}{U_{sc}} = \left(\frac{R_1}{R_1 + X_{C_1}} - \frac{X_{C_2}}{R_2 + X_{C_2}}\right)$$

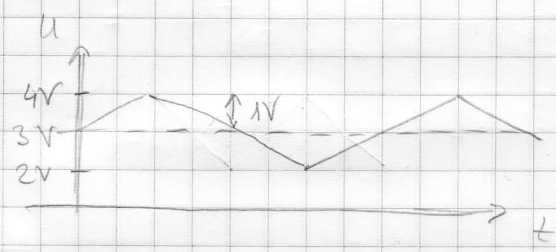
bez smetnje:



$$A = \frac{U_{ul}'}{U_{ul}} = \frac{X_{C_1}}{R_1 + X_{C_1}}$$

$$F = \frac{H_{ul}}{H_{sm}}$$

Zadatak 4.



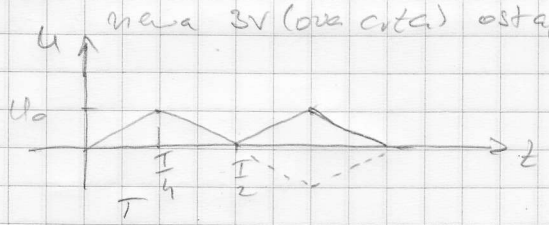
DC VEZA:

$$U_{H,DC} = \frac{1}{T}\int_0^T U_{ul}(t)\,dt = 3V$$

stvarna srednja vrijednost na DC-u

AC VEZA:

nema 3V (ova crta) ostaje samo



$$U_{H,AC} = \frac{1}{T}\int_0^T |U_{ul}(t)|\,dt = \frac{1}{T}\left(U_0 \cdot \frac{T}{2}\right) = \frac{U_0}{2}$$

voltmetar će pokazati:

$$U_{p,AC} = U_{H,AC} \cdot \text{faktor oblika sinusa} = \frac{U_0}{2} \cdot 1{,}11 = 0{,}5V \cdot 1{,}11 = 0{,}555V$$

$$\text{faktor oblika sinusa} = \frac{\frac{U_0}{\sqrt{2}}}{U_0 \cdot \frac{2}{\pi}} = \frac{\pi}{2\sqrt{2}} = 1{,}11$$

za trokutasti: $U_{ef,T} = \frac{U_0}{\sqrt{3}} = 0{,}577V$

$$p = \frac{0{,}577 - 0{,}555}{0{,}577} = 3{,}87\%$$

$$U_{ef} = \sqrt{\frac{1}{T}\int_0^T U_{ul}^2(t)\,dt} \rightarrow \text{za sinusni oblik } U_{ef} = \frac{U_0}{\sqrt{2}}$$

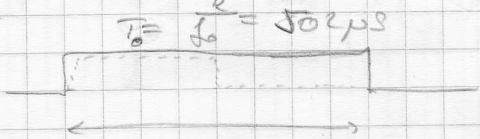
Zadatak 5.

Mjerilo frekvencije → broji dane impulse u vremenskom intervalu

$f_H = 128\ kHz$

oscilator: $f_0 = 1\ MHz$
$\Sigma = 502$

$T_0 = \frac{\Sigma}{f_0} = 502\ \mu s$



broje se impulsi → $N = f_H \cdot T_0 = 64,256 = 65$ perioda signa

$\rho = \frac{1}{T_0 \cdot f_H} = 1,56\ \%$

$N = 65 \pm 1,56\ \%$

$f' = \frac{N}{T_0} = \frac{65}{502 \cdot 6} = 129482\ Hz$

↳ pogreška $\rho = 1,16\ \%$