a) Dla wszystkich badanych obwodów wykonać wykresy punktowe Usk(Isk). R_1C_3

Lp.	U_{sk}[V]	I_{sk}[mA]	I_{sk}[A]	f[Hz]
1	0.01	0.09	0.00009	50
2	1.9	1.64	0.00164	
3	4.05	3.59	0.00359	
4	6.24	5.52	0.00552	
5	7.96	7.04	0.00704	
6	10.21	9.02	0.00902	
7	12.2	10.79	0.01079	
8	14.17	12.52	0.01252	
9	16.1	14.23	0.01423	
10	18.02	15.96	0.01596	
11	19.95	17.67	0.01767	
12	21.88	19.41	0.01941	
13	24.22	21.53	0.02153	

Tabelka 1.0 Wartości zmierzonych dla obwodu RC

b) Określanie metodą regresji liniowej współczynnika kierunkowego Z_c i u(Z_c)

$U_{sk} = Z_c I_{sk}$

$\underline{Z_c = 1127.9\Omega}$

$u(Z_c) = 1.884892 \approx \underline{1.9\Omega}$

d) Dla szeregowego obwodu RC, z zależności (14) wyznaczyć pojemność C oraz jej niepewność uc(C).

$u_C(R) = \underline{3\Omega}$

$\underline{R = 150\Omega}$

$C_3 = C_3(f, Z_c, \mathrm{R})$

$\frac{\partial C_3}{\partial f} = \frac{1}{2\pi f^2\sqrt{Z_c{}^2 - R^2}} = \frac{1}{2*3.14*2500\sqrt{1272158 - 22500}} = \frac{1}{17550735.07}$ = 5.69777E-08≈ = 5.7E-08

$\frac{\partial C_3}{\partial Z_c} = -\frac{Z_c}{2\pi f(Z_c{}^2 - R^2)^{3/2}} = -\frac{1127.9}{314 * 1396969661}$=-2.57131E-09≈ -2.6E-09

$\frac{\partial C_3}{\partial R} = \frac{R}{2\pi\ (Z_c{}^2 - R^2)^{3/2}} = \frac{150}{314 * 1396969661}$=3.41959E-10 ≈3.4E-10

$\Delta_p f$= 1%*rdg+1 = 1%*50+1=1.5[Hz]

$u(f) = u_B\ (f) = \sqrt{\frac{(\Delta_p f)^2}{3}} = \sqrt{\frac{1.5^2}{3}} = \sqrt{\frac{2.25}{3}}$=$\sqrt{0.75}$= 0.86602≈ 0.87[Hz]

$$u_C(C_3) = \sqrt{\left(\frac{\partial C_3}{\partial f} * u(f)\right)^2 + \left(\frac{\partial C_3}{\partial Z_c} * u(Z_c)\right)^2 + \left(\frac{\partial C_3}{\partial R} * u(R)\right)^2} =$$

$$\sqrt{(5.7\mathrm{E}{-}08\ * 0.87)^2 + (-2.60\mathrm{E}{-}09\ * 1.9)^2 + (3.4\mathrm{E}{-}10\ * 3)^2} =$$

$$\sqrt{2.45917\mathrm{E}{-}15\ + 2.44036\mathrm{E}{-}17\ + 1.0404\mathrm{E}{-}18\ } =$$

$\sqrt{2.48461\mathrm{E}{-}15\ }$ =4.98459E-08 ≈ $\underline{5\mathrm{E}{-}08[\mathrm{F}]}$

$C_3 = \frac{1}{2\pi f\sqrt{Z_c{}^2 - R^2}} = \frac{1}{2*3.14*50*\sqrt{1127.9^{\ 2} - 150^{\ 2}}} = \frac{1}{314*1117.881215}$

$= \frac{1}{351014.7}$=2.84888E-06 [F]