Appendix, Calculations of RC Filter

$i := 1 .. 7$ $f_i :=$ $R := 1050 \cdot \Omega$ $C := 0.1 \cdot \mu F$

f_i
100·Hz
300·Hz
1·kHz
3·kHz
10·kHz
30·kHz
100·kHz

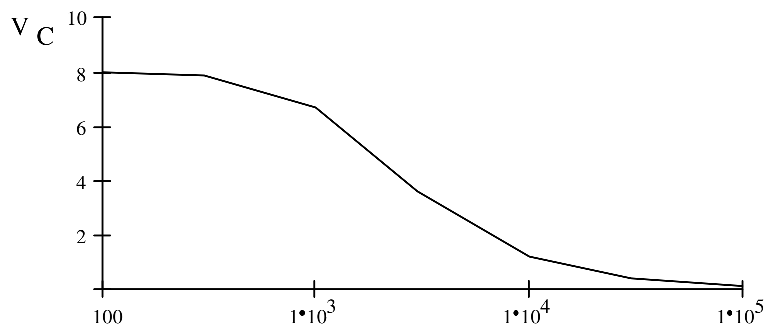
$$\omega_i := 2 \cdot \pi \cdot f_i$$

$$I_i := \frac{8 \cdot V}{\sqrt{R^2 + \frac{1}{\left(\omega_i \cdot C\right)^2}}}$$

$$V_{C_i} := \frac{1}{\omega_i \cdot C} \cdot I_i$$

$$V_{R_i} := R \cdot I_i$$

$\frac{f_i}{kHz}$	$\frac{V_{C_i}}{V_{pp}}$	$\frac{V_{R_i}}{V}$
0.1	7.983	0.527
0.3	7.848	1.553
1	6.678	4.406
3	3.608	7.14
10	1.199	7.91
30	0.404	7.99
100	0.121	7.999



The peak and peak-to-peak voltages can add up to more than the input because the peaks do not occur at the same time. The capacitor makes the waveforms out-of-phase.

At any instant in time, the voltages *do* add up exactly as you would expect and as Kirtchoff's laws predict.

$$v_R + v_C = v_S$$

Instant values (along any vertical line) of v_R and v_C *do* add up to v_S.