Problem 1

We need to use $R = 10\Omega$. Therefore

$$t_{\text{rise}} = 2.2RC = 2.2 \cdot 10\Omega \cdot 100\mu\text{F} = 2200\mu\text{s} = 2.2\text{ms}$$

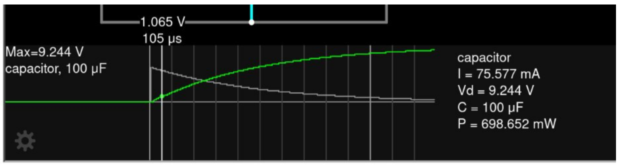
Problem 2

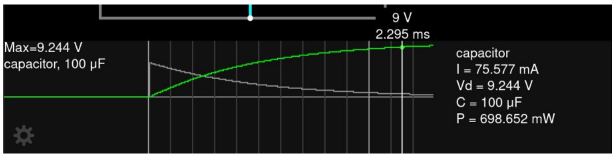
We need to use $R = 100\Omega$. Therefore

$$t_{\text{fall}} = 2.2RC = 2.2 \cdot 100\Omega \cdot 100\mu\text{F} = 22000\mu\text{s} = 22\text{ms}$$

Problem 3

There are the screenshots of the `10%` mark and the `90%` mark of the charging process





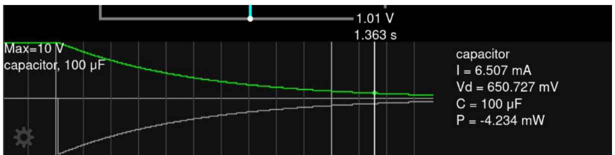
Therefore

$$t_{\text{rise, falstad}} = 2.295\text{ms} - 0.105\text{ms} = 2.19\text{ms}$$

which matches the theoretical results.

Problem 4

There are the screenshots of the `10%` mark and the `90%` mark of the discharing process



Therefore

$$t_{\text{fall, falstad}} = 1.363\text{s} - 1.341\text{s} = 0.022\text{s} = 22\text{ms}$$

which matches the theoretical results.

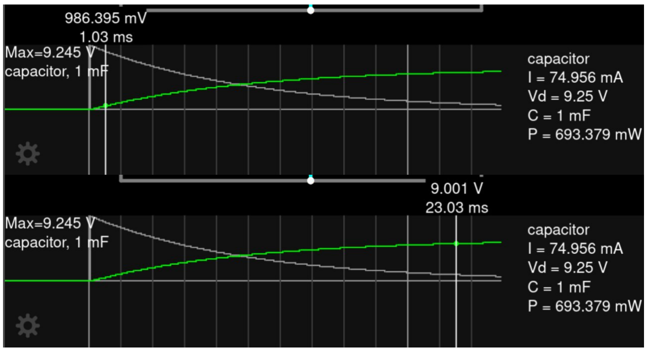
Problem 5

Just do the calculation again, but with $C = 1000\mu\text{F}$ this time, and we get

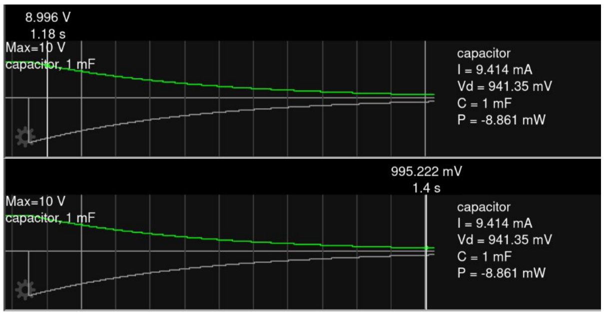
$$t_{\text{rise}} = 2.2RC = 2.2 \cdot 10\Omega \cdot 1000\mu\text{F} = 22000\mu\text{s} = 22\text{ms}$$
$$t_{\text{fall}} = 2.2RC = 2.2 \cdot 100\Omega \cdot 1000\mu\text{F} = 220000\mu\text{s} = 220\text{ms}$$

Problem 6

There are the screenshots of the `10%` mark and the `90%` mark of the charging process



There are the screenshots of the `10%` mark and the `90%` mark of the discharing process



We could thus get

$$t_{\text{rise, falstad}} = 23.03\text{ms} - 1.03\text{ms} = 22.00\text{ms}$$
$$t_{\text{fall, falstad}} = 1.4\text{s} - 1.18\text{s} = 0.22\text{s} = 220\text{ms}$$

which matches with our theoretical result.