Basic OP-AMP Circuits

1) Which basis op-amp circuit is suitable for detecting whether one input voltage is lower or higher than the other input voltage?

-> comparator

2) Which input of a comparator is normally supplied with the reference voltage?

-> the negative input

3) What does it mean if a comparator has an input offset voltage of 0.2V?

-> this is the same as if the reference voltage would have a value of V\_REF - 0.2V

4) The input voltages of a summing amplifier are supplied via a 3.9kOhm resistor. Calculate the feedback resistor if the amplifier shall have a voltage gain of 10.

-> R\_F = 39kOhm

5) A scaling adder shall have an input voltage of 3V @ 10kOhm and 2V @ 100kOhm. Calculate the output voltage if the feedback resistor is 10kOhm.

-> V\_OUT = - 10kOhm \* ( 1 / 10kOhm \* 3V + 1 / 100kOhm \* 2V ) = - 3.2V

6) What is the maximum feedback resistor if the maximum output voltage is limited to 2.5V?

-> R\_F = 7.813kOhm

7) Which value should be chosen if only 7.68kOhm or 7.87kOhm is available?

-> 7.68kOhm because than the output is definitely smaller than 2.5V so there's no limitation.

8) Which circuit is built if there's a capacitor in the feedback of an op-amp?

-> integrator

9) A characteristic parameter of an integrator is the output slope dV\_OUT / dt. What's about the value of the capacitor if the slope should be very high?

-> dt must be very small; since dt = R\*C the capacitor must also be very small

10) What has to be changed if a differentiator shall be built?

11) Draw a single-pole low- and high-pass active filter.

12) Why do we use op-amps for active filtering?

-> higher linearity in contrast to a passive filter

13) Draw a double-pole high-low-pass active filter combination.

14) An op-amp has a natural low-pass characteristic. What does that mean if the op-amp should be used in an active low-pass filter?

-> Normally a low-pass active filter has unity gain. That means the cut-off frequency of the low-pass active filter

must be smaller than the natural cut-off frequency of the op-amp for unity gain.

15) What is the slope of the transfer characteristic of active filters?

-> -20dB/DEC