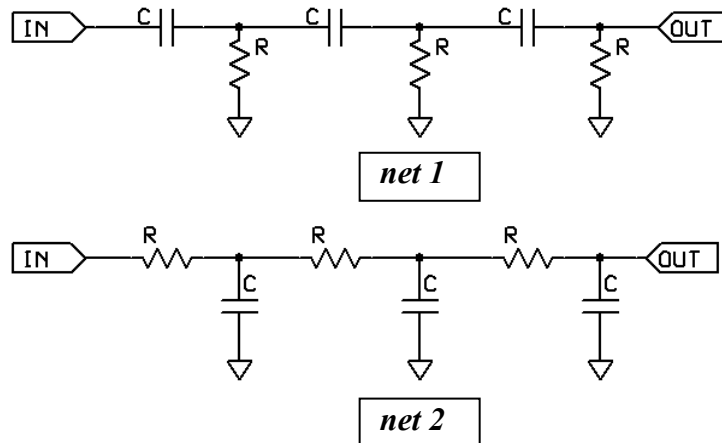## Handout RC Oscillators

We are designing a phase-shift RC oscillator. However, we do not quite remember the structure for the feedback network of the oscillator. We know well that it is composed by Capacitnaces and Resistors, but out of the two ways that we have to connect them (shown on the figure below), we have not been able to decide which one is correct.

net 1

net 2

Answer to the following questions:

1. Analize both networks, providing their transfer function. Which one of the two can be used in the Phase-Shift oscillator? Reason your answer and provide the oscillation frequency.

2. For the networks above that can be used in our oscillator, plot their Bode diagram.

3. Using an OP AMP, design the amplifier stage that the RC feedback networks above requires to build the oscillator. Reason your answer and provide the required gain for the oscillator.

NOTA: In a RC ladder network, where the three capacitances and resistances are equal, you can used the following expression:

$$\frac{V_e}{V_o}(s) = \frac{1}{\left(\dfrac{Z_1(s)}{Z_2(s)}\right)^3 + 5\left(\dfrac{Z_1(s)}{Z_2(s)}\right)^2 + 6\left(\dfrac{Z_1(s)}{Z_2(s)}\right) + 1}$$