1. (C-9) The course schedule is on the course website, accessible from bCourses. Please check announcements before each exam for locations, as exams are not always held in the lecture hall.

Date by which to inform GSI of special requirements for exams	
Date & Start Time of exam 1	
Date & Start Time of exam 2	
Date of first lab (choose partner & get parts)	
Date of first discussion	

2. (C-2) Metric prefixes are frequently used in engineering to denote very large or small quantities. E.g. 5.4 μV = 5.4e-6V = 0.0000054 V. Convert the quantities in the table below to exponential notation:

3.2 kg	=		g
9 pF	=		F
3 THz	=		Hz

3. (C-3) To avoid ambiguity always specify the correct unit with your answers. Unless otherwise specified, use SI-units.

   What is the SI-unit for temperature?

4. (2-2) What is the SI symbol for 10^{-18}?

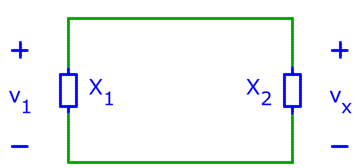
5. (2-4)

   A wire carries a 6.9 μA current. Calculate the number of electrons passing per second.

6. (2-8) In the circuit below find v_x for

   $v_1 = 2.7\,\mathrm{V}$

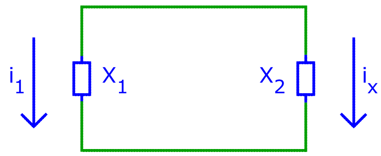
   $v_1 = -4.3\,\mathrm{V}$



7. (2-9) In the circuit below find i_x for

$i_1 = 4.9\,\text{mA} \qquad i_x =$

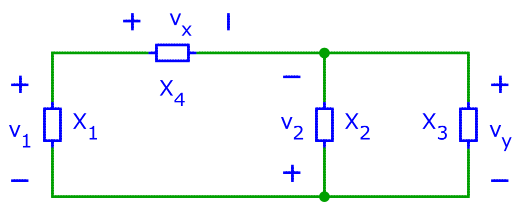
$i_1 = -1.8\,\mu\text{A} \qquad i_x =$



8. (2-11) In the circuit below v_1=4.9 kV and v_2=4.4 kV. Find

$v_x =$

$v_y =$

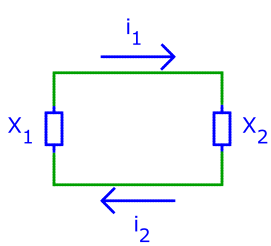


9. (2-5) The force between two electrical charges q_1 and q_2 at distance r can be calculated using Coulomb's law,

$$F_c = \frac{1}{4\pi\epsilon_0}\frac{q_1 q_2}{r^2}$$

a) Calculate the absolute value of the electrostatic force between an electron and a proton at distance $r = 1\,\text{mm}$.

b) From the assumption that the net charge on every circuit component remains zero at all times, it follows that currents i_1 and i_2 are equal in the circuit shown below. To get a better appreciation for the assumption, let's assume instead that $i_1 = 0\,\text{A}$ and $i_2 = 8\,\text{mA}$. Then negatively charged electrons accumulate on X_2, leaving behind positively charged atomic nuclei on X_1. Calculate the attractive force (it is positive) between X_1 and X_2 after $t = 1\,\text{s}$ for X_1 and X_2 at a distance of 4 mm (treat X_1 and X_2 as point charges, i.e. the equation above is valid).



c) How many loaded trucks weighing $m = 40000\,\text{kg}$ each can you lift with this force? For effect, write down your "best guess" before doing the calculation.

Let's stick with the assumption of charge neutrality, ok?

10. (2-7) A computer operating at frequency $f_s = 2.8\,\mathrm{GHz}$ executes instructions in $T = 1/f_s$ seconds. Assuming that electrical signals propagate at the speed of light, how far do signals propagate in one cycle T?

The designers of high-speed computers must take this into consideration. But the clock rates of the circuits we design is lower and the assumption of "infinite" speed is justified.

11. (J-14) Write a Python program that prints out the number of decimal digits of the result of 5 to the power 971.
Hint: convert the numeric answer to a string.