EECS 49 HW1

1. a) 2/5/2019

   b) 3/7 in class at 5:00

   c) 5/2 in class at 5:30

   d) Week of 1/28, for me 1/31

   e) Monday 1/28

2. a) 3.2 kg = $\boxed{3.2 \cdot 10^{3}\ g}$

   b) 9 pF = $\boxed{9 \cdot 10^{-12}\ F}$

   c) 3 THz = $\boxed{3 \cdot 10^{12}\ Hz}$

3. SI-unit for temperature

   → Kelvin

4. a (atto)

5. $6.24 \cdot 10^{18}$ electrons/C $\cdot$ $6.9 \cdot 10^{-6}$ C/s

   = $\boxed{4.31 \cdot 10^{13}\ \text{electrons/s}}$

6. $V_1 = 2.7\ V \rightarrow \boxed{V_x = 2.7\ V}$

   $V_1 = -4.3\ V \rightarrow \boxed{V_x = -4.3\ V}$

   → Due to KVL

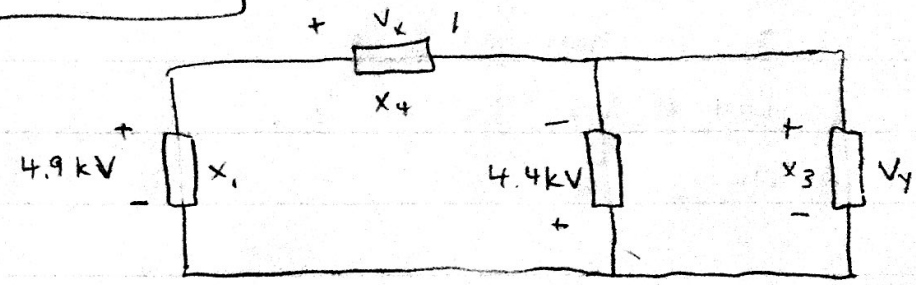
7. $i_1 = 4.9\ mA \rightarrow$ $i_x = -4.9 mA$

$i_1 = -1.8\ \mu A \rightarrow$ $i_x = 1.8\ \mu A$

→ due to KCL

8. $V_x =$ 9.3 kV

$V_y =$ −4.4 kV



From KVL, $V_1 - V_x + V_2 = 0 \rightarrow V_x = V_1 + V_2 = 9.3\ kV$

$V_2 + V_y = 0 \rightarrow V_y = -V_2 \rightarrow V_y = -4.4\ kV$

9. a) $F_C = \frac{1}{4\pi\varepsilon_0} \cdot \frac{-1.6 \cdot 10^{-19} C \cdot 1.6 \cdot 10^{-19} C}{(1 \cdot 10^{-3} m)^2}$

$= \frac{1}{4 \cdot \pi \cdot 8.85 \cdot 10^{-12} F/m} \cdot \frac{-2.56 \cdot 10^{-38} C}{1 \cdot 10^{-6} m^2}$

$= \frac{-2.56 \cdot 10^{-38} C}{4 \cdot \pi \cdot 8.85 \cdot 10^{-18} Fm} =$ $+2.3 \cdot 10^{-22}$ N

b) $6.24 \cdot 10^{18}$ electrons/coulomb $\cdot\ 8 \cdot 10^{-3}$ C/s

$= 4.99 \cdot 10^{15}$ e/s

$\frac{4.99 \cdot 10^{15} e \cdot -4.99 \cdot 10^{15} e}{4\pi\varepsilon_0 \cdot (4 \cdot 10^{-3} m)^2} =$ 358065501.22 N

c) Predictron - 9000 trucks

- 913 trucks

10. $3 \cdot 10^8$ m/s , $2.8 \cdot 10^9$ cyc/sec , $\frac{1}{2.8 \cdot 10^9}$ sec/cycle

$\frac{1}{2.8 \cdot 10^9} \frac{\text{sec}}{\text{cycle}} \cdot 1 \text{ cycle} \cdot 3.0 \cdot 10^8 \text{ m/sec}$

$= \boxed{0.107 \text{ m}}$

11.
```
import math
result = math.pow(5, 971)
result_str = str(result)
print(len(result_str) - 1)        (because of decimal point)
```