1) This assignment is being prepared on a laptop that requires 65W of power. If it is plugged into a 20V outlet, determine: (6 marks)
    a) The current the laptop draws
    P = V * I
    65 = (20)I
    I = 65/20
    I = 3.25A

    b) The resistance of the power supply
    R = V/I
    R = 20 / 3.25
    R = 6.15 Ω

    c) The cost of the energy needed to run the laptop to make this test (which takes about 5400 seconds). Assume that energy costs $0.12/kWh.
    E = P * t
    E = 0.65kW * 1.5h
    E = 0.975kWh

    Cost = E * rate
    Cost = 0.975kWh * $0.12/kWh
    Cost = $0.12

2) To run a space heater, 375mA of current is run through a 5000Ω heating element (which acts like a resistor). If this whole process takes 45 minutes, determine: (8 marks)

    Knowns:
    I = 375mA = 0.375A
    R = 5000Ω
    t = 45min = 0.75h = 2700s

    a) The potential difference of the heating element
    V = I * R
    V = 0.375A * 5000Ω
    V = 1,875V

    b) The total charge that passes through the heating element
    Q = total charge
    Q = I * t
    Q = 0.375A * 2700s
    Q = 0.375 C/s * 2700s
    Q = 1,012.5C

c) The energy released by the heating element

$P = V * I$

$P = 1{,}875V * 0.375A$

$P = 703.125W$

$E = P * t$

$E = 703.125W * 0.75h$

$E = 527.34kWh$

d) The number of electrons that pass through the heating element.

n = number of electrons

Coulomb Charge (e) = $1.6 * 10^{-19}C$

$Q = n * |e|$

$n = Q / |e|$

$n = 1{,}012.5C / 1.6 * 10^{-19}C$

$n = 6.328125 \times 10^{21}$