Week's submission 2

1) Write a summary (in your own words !, (in your own words !!!) about the convective heat transfer (half a page) and explain why increasing the thickness of a single pane glass does not increase the total resistane

- **Convection** is a heat transfer throught movment of fluids, such as water and air. While conduction is willingness of the material to transfer the heat, convection is willingness f transferring the heat through moving of solids.

  There are two types of convection:

  1) **Natura**l: tendency of warmer and less dense molecules to rise, and colder to sink it makes a movement because of the different behavior of two elements.

  2) **Forced:** to start a movement between molecules it is needed to have an artificial power like fan, or to the natural one; wind

  The thickness of the glass has no influence to it resistance. If we change the thickness, the resistance would change just a bit. It thickness has to be just enough for it not to break.

  The rate of heat transfer depends on:

  1. Difference of the heat

  2. Speed of the fluids

  3. Type of fluid

  Newton law of cooling:

  the higher 'h' is there is less resistance (because 'h' and R are not proportional)

  $Rconv = \frac{1}{h \times A_s}$

2) Write an explanation about what mistakes you made in the class that resulted in wrong answers !!

   - The mistake that I made in the first task was that I haven't transfer units correctly. I haven't put meters instead of millimeters where it was needed.

3) Solve the same problem as that of double pane window with with the air-gap thickness of 13 mm and glass thickness of 6 mm, comment on your results and explain why we have an optimal range for the air-gap's distance !

k=0,78W/ °C A=0,8*1,5=1,2 m2
k= 0.026 W/m.°C
x=13mm
h1= 10 W/m2 · °C
h2=40 W/m2 · °C

$$R_{g_1} = R_{g_2} = \frac{L_g}{\left(K_g \times A\right)} = \frac{0.004}{0.78 * 1.2} = 0.0043\ ° \frac{C}{W}$$

$$R_{airGap} = \frac{L_{airGap}}{\left(K_{airGap} \times A\right)} = \frac{0.013}{0.026 * 1.2} = 0.416\ °C/W$$

$$R_{conv_1} = \frac{1}{h_1 \times A} = (\frac{1}{10 * 1.2)} = 0.0833\ °C/W$$

$$R_{conv_2} = \frac{1}{h_2 \times A} = (\frac{1}{40 * 1.2)} = 0.0208\ ° \frac{C}{W}$$

$$R_{tot} = R_{conv_1} + R_{conv_2} + 2 \times R_g + R_{airGap}$$

$$= 0.0833 + 0.0208 + 2 * 0.0043 + 0.416 = 0.53529\ ° \frac{C}{W}$$

$$\dot{Q} = \frac{\Delta T}{R_{Tot}} = \frac{30}{0.5329} = 56{,}29\ W$$

$$\dot{Q} = \frac{T_{inff_1} - T_{s_1}}{R_{conv_1}} \Rightarrow 55{,}29 = \frac{20 - T_{s_1}}{0.0833} \rightarrow T_{S_1=15.1°C}$$