WEEK 6-KHAN BABAR
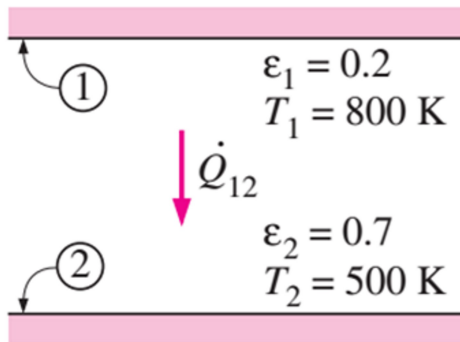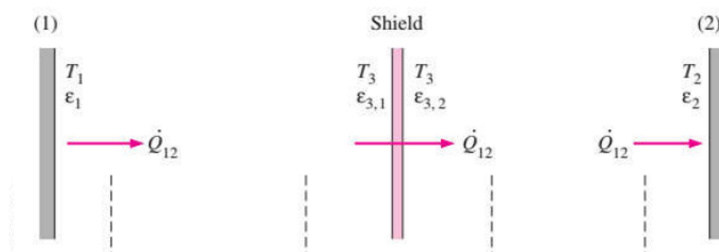

$\sigma = 5.67 \times 10^{-8}$

NET HEAT TRANSFER WITHOUT SHIELDS?

$$\frac{\dot{Q}}{A} = \frac{\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1}$$

$$\frac{\dot{Q}}{A} = 5.67 \times 10^{-8} \frac{800^4 - 500^4}{\frac{1}{0.2} + \frac{1}{0.7} - 1} = 3625.4 \frac{W}{m^2}$$

How many shields with epsilon = 0.1 should you add in order to have the new heat transfer rate to be 1% of the case without shields ?
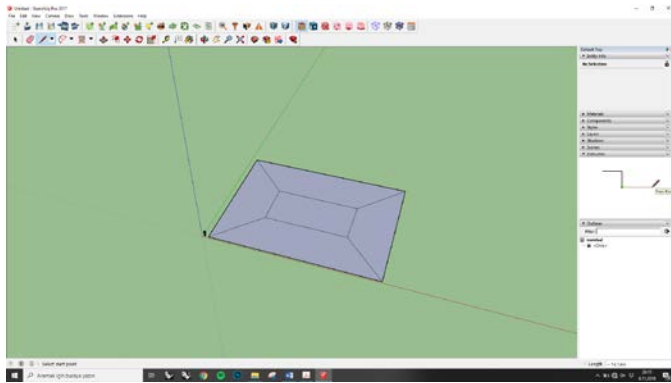
$3625.4 * \%1 = 36.25$

$$\frac{\dot{Q}}{A} = \frac{\sigma(T_1^4 - T_2^4)}{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_1} + -1\right) + \left(\frac{1}{\epsilon_{3,1}} + \frac{1}{\epsilon_{3,2}} - 1\right) + \left(\frac{1}{\epsilon_{4,1}} + \frac{1}{\epsilon_{4,2}} - 1\right) + \cdots \cdots + \left(\frac{1}{\epsilon_{n,1}} + \frac{1}{\epsilon_{4,1}} - 1\right)}$$

$$= 5.67 \times 10^{-8} \frac{800^4 - 500^4}{\left(\frac{1}{0.2} + \frac{1}{0.7} - 1\right) + n.\left(\frac{1}{0.1} + \frac{1}{0.1} - 1\right)} = 36.25$$
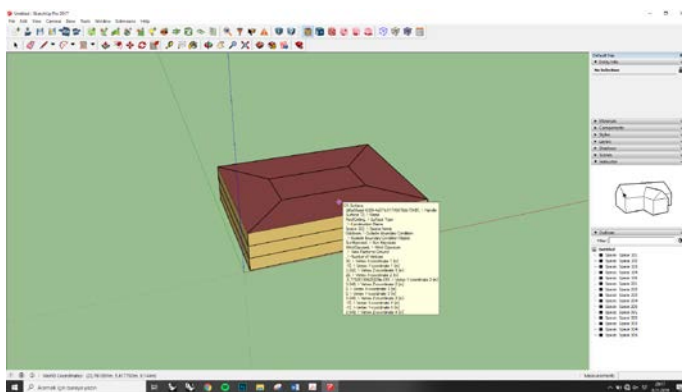
$$\frac{19680.57}{5.42 + 19n} = 36.25$$

19680.57=36.25(5.42+19n)
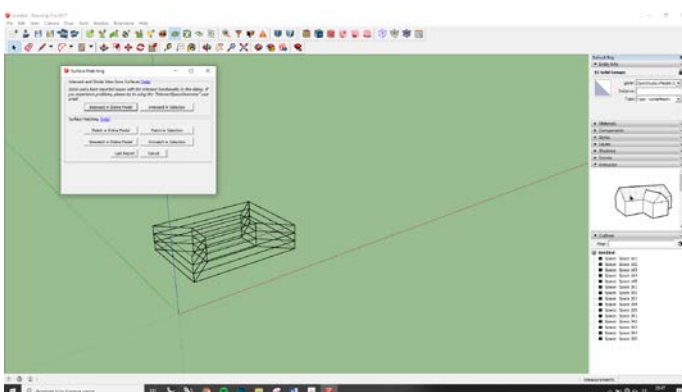542.91-5.42=19n
537.49=19n
28.1=n

28 SHIELDS WITH $\epsilon = 0.1$ IN ORDER TO LOVER THE RADIATIVE HEAT TRANSFER TO %1
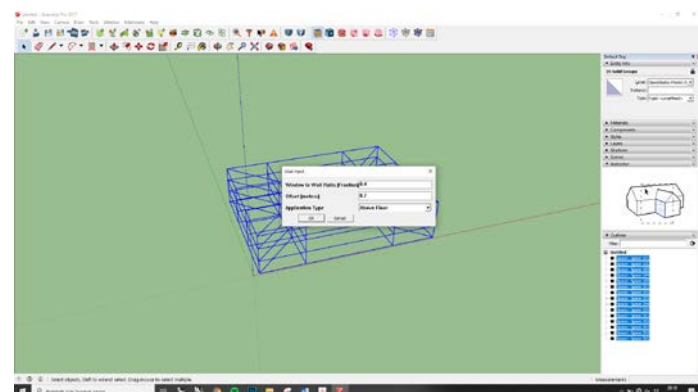
First, in sketch up I created the floor plan of a simple office building. Open offices and the break room.
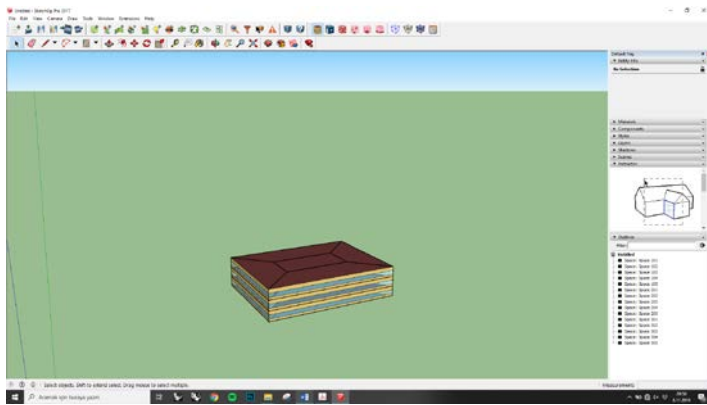

Then I clicked the create spaces from diagram, floor height 10' and 3 floors. I can see the information with the info tool.
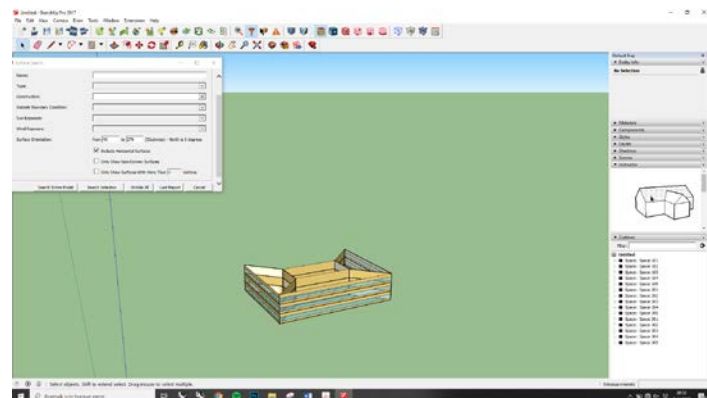

In order to define interior and outer walls, I used surface matching tool.

Then using the extensions tab I added the window ratios to the spaces of 70%
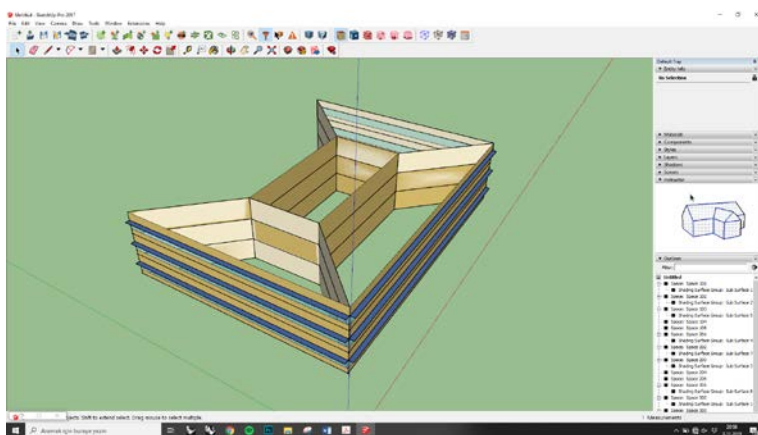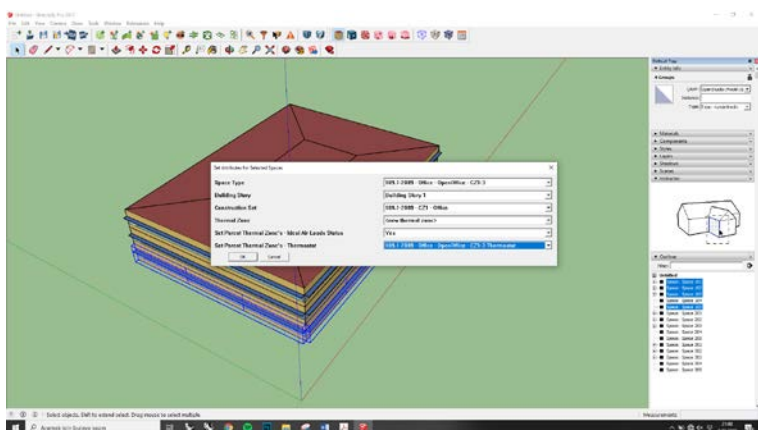
Windows are created.

To create shadings for necessary facades, I use the surface selection, selecting all the facades but the north.

With 45-270

The facades are selected, I used the extensions window to add overhangs (external shadings.)

When the shadings are done, I use the side bar to select the spaces and define thermal zones.

I am done with sketch up. Saved my progress.

I open OpenStudio and open my file which I created in Skethup.

I add weather and design days in the file by importing.

I run the model.

I have my results in the last tab.