**AE331 HEAT TRANSFER**
**Online Midterm**
**December 17, 2020**
**(open notes and books)**

**Rules for the midterm**

1. Your camera and microphone should be open during the quiz (you can reduce your speaker's volume if the voice is bothering you but you should not reduce the volume of your microphone)
2. You should not communicate with anybody during the quiz.
3. You should sit in front of your computer where the assistants can clearly see you even if you finish the quiz earlier.
4. You should be alone during the quiz.
5. Please sign the following statements and upload this page with your solution papers.

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I affirm that all the work done on this quiz is my own; have obeyed the rules indicated above and I have not given or received any help during this quiz. I understand that any indication of violation of this word of honor may lead to a zero grade on this quiz and to a disciplinary action.

Name: ID number: Date/Signature:

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**Question 1**
**Duration: 30 min for solution + 10 min for uploading**

Assume that the thickness of an object shown below is changing with the following relation

$$\text{thickness} = 2y = (b-a)\left(\frac{x}{L}\right)^2 + a \qquad [\text{m}]$$

As shown in the figure, the object has a rectangular cross section. The side surfaces of the object are well insulated. The end temperatures are T(x=0) = 3ab [K] and T(x=L) = 5ab [K]. The thermal conductivity of the object is k = 2ab [W/mK]. The length of the plate is L = ab [m].

a) Derive and calculate the temperature distribution T(x)
b) Calculate the heat transfer rate in x direction, $q_x$.

Where "a" and "b" are the symbols that represent the last two digits of your id number. For example, if your id number is 7134251 = 71342ab, then a=5, b=1. (If any of these symbols has a zero value and cause difficulties in the solution, you can replace this value with the third digit of your id number)