Homework #3 Due: 9/1

Show all work for full credit.

20 pts total

Name: _____

1. Calculate the rate of heat loss due to transmission, infiltration, and ventilation for a 96 ft x 100 ft. single story office building. The ceiling height is 12 feet, and the maximum occupancy is 80 people. The ACH = 6.0. The required ventilation rate per person is 15 CFM. Inside temperature is 72°F and the outside temperature is 45°F. Use 3-decimals for all U-factors. Neglect the heat loss due to the flat roof.
   Round all calculations for q to whole numbers. Show all calculations for full credit.

   Complete the following:

A. Heat Loss Due to Transmission

Specifications		Calculate the U-Factor (3-decimals)
Walls	R-19 (6" insulation)	
Ceilings	R-30 (10" insulation)	
Windows	R-3.13	
Doors	R-3.70	

Floor SOG (2 in thick edge insulation, R=5)

Gross Wall Area = 2 x 96 ft x 12 ft + 2 x 100 ft x 12 ft = 2304 ft^2 + 2400 ft^2 = 4704 ft^2
Window Area = 1600 ft^2
Door Area = 320 ft^2
Ceiling Area = 9600 ft^2

Calculate the Net Wall Area = _____

$q_{transmission}$ = U x A x ΔT

Building Element	U-Factor	Area (ft^2)	ΔT (°F)	q (BTUH)
Walls				
Windows				
Doors				
Ceiling				
Slab = Uf x L				
			Total Heat Loss Due to Transmission	

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B. Heat Loss Due to Infiltration

$q_{infililtration} = C \times ACH \times V \times \Delta T$

C. Heat Loss Due to Ventilation

$q_{ventilation} = 1.1 \times Q_{airflow} \times \Delta T$

D. Calculate the Total Rate of Heat Loss for the Office Building

$q_{transmission}$	
$q_{infililtration}$	
$q_{ventilation}$	
q_{total}	