


CMGT 235 – Electrical and Mechanical Systems

Department of Construction Management  California State University, Chico

Exam #1 [100 points]

You may work together as a group or individually. Every student SHALL complete their own answer sheet.

Name:

Name:

Name:

- 15 pts 1. A 6 in x 6 in x 3 in ice cube is held in a freezer at 0°F. How much heat is required to turn the ice cube to steam?

35 pts 2. For the tiny home plan shown the inside temperature is 72°F and the outside temperature is -15°F.

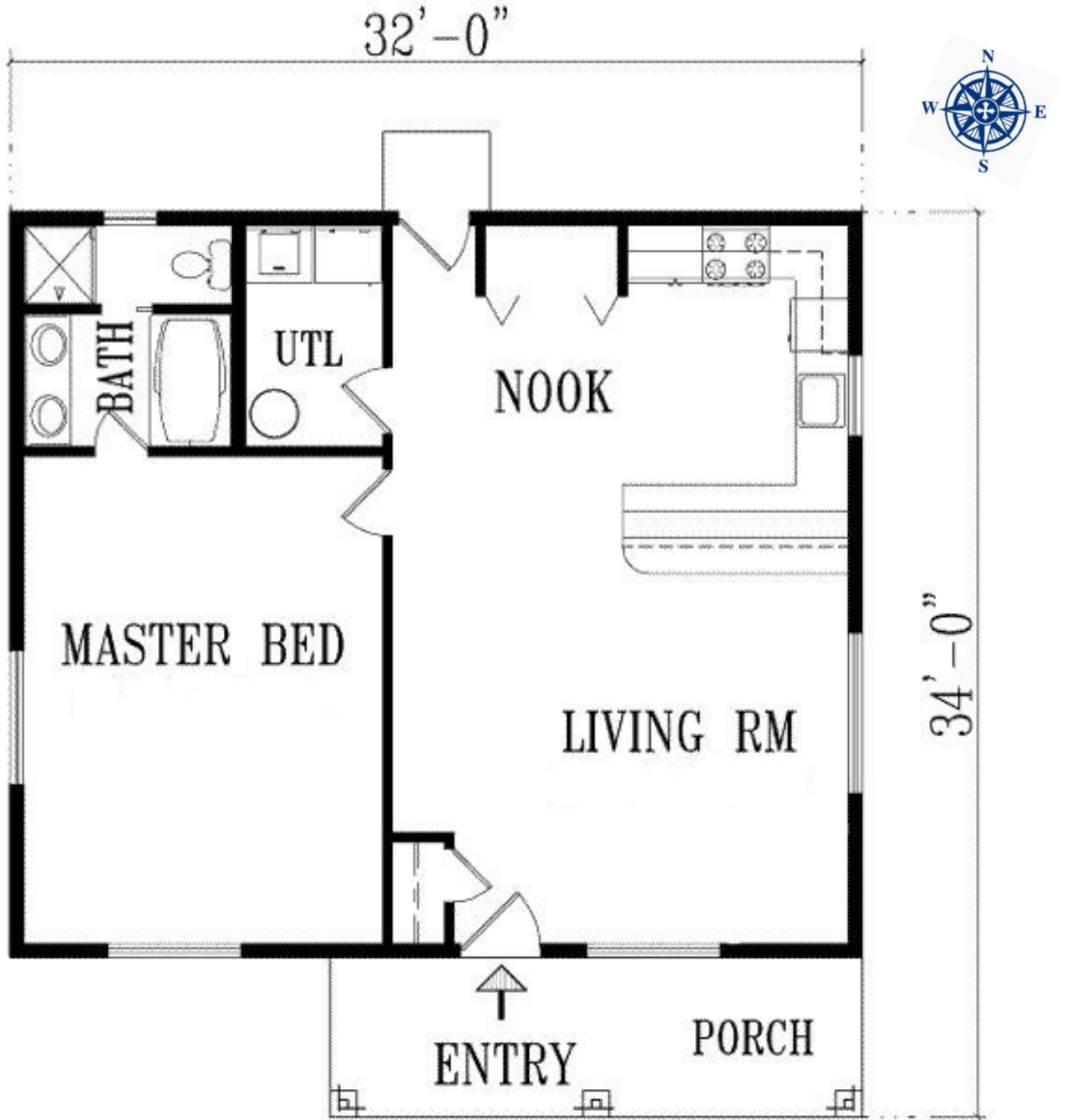
Specifications

Window Sizes

Bathroom	3 ft x 2 ft
Nook	3 ft x 3 ft
Living Room	6 ft x 4 ft and 5 ft x 3 ft
Master Bedroom	5 ft x 3 ft E

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)

Door	21 ft ² E
Ceiling Height	8 ft
Wood Porch	4 ft x 18 ft



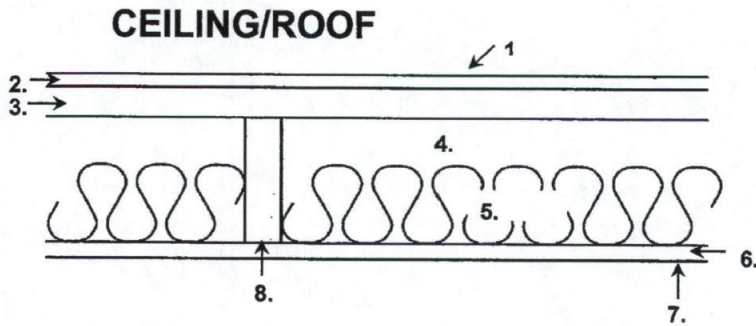
Use 3-decimals for all U-factors. Round all calculations to whole numbers.

A. Determine the total heat loss due to transmission.

B. Determine the heat loss due to infiltration for an ACH = 1.2

C. Determine the Total Heat Loss.

- 25 pts 3. Calculate the total heat loss during a 24-hour period for a flat roof 55 ft X 70 ft. The roof is constructed per the detail below. The inside temperature is 70 °F and the outside temperature is 52 °F. Assume winter conditions. Use 2-decimals for R Values and 3-decimals for U-Factors. Round answer to a whole number.



		R (Between joist)	R (At joist)
1.	Air film outside		
2.	3/8 in. Built-up roofing		
3.	5/8 in. Plywood Sheathing		
4.	1 ½ in. Air space		
5.	R-13 Fiberglass Batt Insulation		
6.	5/8 in. Gypsum board		
7.	Air film inside		
8.	Nominal 2-in x 12-in Doug Fir Joist @ 24 in. o.c.		
R_{Total}			

Determine the average U-Factor for the ceiling

Psychrometric Chart

- 10 pts 4. Given the ambient temperature is 70°F measured by a dry bulb thermometer and 60°F measured by a wet bulb thermometer, what is the relative humidity?

Is this point an acceptable temperature and humidity for personal comfort all year for people in the USA?

- 15 pts 5. A house is 4500 ft² and has 12 ft ceilings. For comfort, the homeowner specifies 0.3 changes of air per hour. The outside air temperature is 90°F dry bulb and 73.5° wet bulb. The air indoors is 75°F dry bulb 50% relative humidity. What is the amount of cooling required to provide the fresh air?