LAB ASSIGNMENTS

Problem Solving and Program Design Using C

(CSE 3942)

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Lab Assignment-1

1. Programming Projects on Overview of C

1.1 Write a program that calculates mileage reimbursement for a salesperson at a rate of $.35 per mile. Your program should interact with the user in this manner: MILEAGE REIMBURSEMENT CALCULATOR
Enter beginning odometer reading=> 13505.2
Enter ending odometer reading=> 13810.6
You traveled 305.4 miles. At $0.35 per mile,
your reimbursement is $106.89.

1.2 Write a program to assist in the design of a hydroelectric dam. Prompt the user for the height of the dam and for the number of cubic meters of water that are projected to flow from the top to the bottom of the dam each second. Predict how many megawatts (1MW = 10^6W) of power will be produced if 90% of the work done on the water by gravity is converted to electrical energy. Note that the mass of one cubic meter of water is 1000 kg. Use 9.80 $meters/second^2$ as the gravitational constant g . Be sure to use meaningful names for both the gravitational constant and the 90% efficiency constant. For one run, use a height of 170 m and flow of 1.30×10^3 m^3/s. The relevant formula (w = work, m = mass, g = gravity, h = height) is: w = mgh.

1.3 Write a program that estimates the temperature in a freezer (in °C) given the elapsed time (hours) since a power failure. Assume this temperature (T) is given by

$$T = \frac{4t^2}{t+2} - 20$$

where t is the time since the power failure. Your program should prompt the user to enter how long it has been since the start of the power failure in whole hours and minutes. Note that you will need to convert the elapsed time into hours. For example, if the user entered 2 30 (2 hours 30 minutes), you would need to convert this to 2.5 hours.

1.4 Write a program to convert a temperature in degrees Fahrenheit to degrees Celsius.

DATA REQUIREMENTS
Problem Input
int fahrenheit /* temperature in degrees Fahrenheit */
Problem Output
double celsius /* temperature in degrees Celsius */
Relevant Formula
celsius = 5/9 (fahrenheit - 32)

1.5 Metro City Planners proposes that a community conserve its water supply by replacing all the community's toilets with low-flush models that use only 2 liters per flush. Assume that there is about 1 toilet for every 3 persons, that existing toilets use an average of 15 liters per flush, that a toilet is flushed on average 14 times per day, and that the cost to install each new toilet is $150. Write a program that would estimate the magnitude (liters/day) and cost of the water saved based on the community's population.

1.6 Write a program that takes the length and width of a rectangular yard and the length and width of a rectangular house situated in the yard. Your program should compute the time required to cut the grass at the rate of two square feet a second.