

Homework 1

PROBLEM SOLVING IN C
(CSCE 105, FALL 2005)

URL: <http://www.cse.unl.edu/~cstrobe/csce105f05/>

Due on 16th September, 2005

31st August, 2005

Name :
Course No : **CSCE105**

Instructions:

For question 1, fill in the table with the your answers. For questions 2 through 6 put your answer in the provided answer box. For questions 7, 8, 9, and 10, use a text editor **NOT Microsoft Word** or integrated development environment to type up your program and attach your source code. **If you use a compiler other than those on CSE, make sure that your code works on CSE!** Also for questions 7, 8, 9, and 10, turn in your source code using the WebHandin.

1. (10 points)

Indicate which of the following are valid type **int**, **double**, **char** constants in C and which are not. Identify the data type of each valid constant.

15.0		"X"		'&'	
&		25		3.14	
-0		.1		'q'	
"XYZ"					

2. (10 points) What is illegal about the following program fragment?

```
#include <stdio.h>
#define PI 3.14159
int
main(void) {
    double c, r;

    scanf("%lf%lf", c, r);
    PI = c / (2 * r);
    ...
}
```

Answer Box:

3. (10 points) Convert the program statements below to take input from the file data.txt and echo it in batch mode.

```
printf("Enter two characters> ");  
scanf("%c%c", &c1, &c2);  
printf("Enter three integers separated by spaces> ");  
scanf("%d%d%d", &n, &m, &p);
```

Answer Box:

4. (10 points) Write a multiple-alternative `if` statement to display a message indicating the educational level of a student based on the student's number of years of schooling (0, none; 1-5, elementary school; 6-8 middle school; 9-12 high school; more than 12, college). Print a message to indicate bad data as well.

Answer Box:

5. (10 points) Write a switch statement to select an operation based on the value of `inventory`. Increment `total_paper` by `paper_order` if `inventory` is 'B' or 'C'; increment `total_paper` by `paper_order` if `inventory` is 'E', 'F', or 'D'; increment `total_label` by `label_order` if `inventory` is 'A' or 'X'. Do nothing if `inventory` is 'M'. Display an error message if the value of `inventory` is not one of these eight letters.

Answer Box:

6. (10 points)
Write an `if` statement that displays an acceptance message for an astronaut candidate if the person's weight is between the values of `opt_min` and `opt_max` inclusive, the person's age is between `age_min` and `age_max` inclusive, and the person is a nonsmoker (`smoker` is false).

Answer Box:

7. (10 points) Write a program that calculates mileage reimbursement for a salesperson at a rate of \$0.35 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 \$.35 per mile,
your reimbursement is \$106.89.

8. (10 points) 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 and 30 minutes), you would need to convert this to 2.5 hours.

9. (10 points) The National Earthquake Information Center has asked you to write a program implementing the following decision table to characterize an earthquake based on its Richter scale number.

Richter Scale Number (n)	Characterization
$n < 5.0$	Little or no damage
$5.0 \leq n < 5.5$	Some damage
$5.5 \leq n < 6.5$	Serious damage: walls may crack or fall
$6.5 \leq n < 7.5$	Disaster: house and buildings may collapse
higher	Catastrophe: most buildings destroyed

10. (10 points) Write a program that will calculate and print bills for the city power company. The rates vary depending on whether the use is residential, commercial, or industrial. A code of **R** means residential use, a code of **C** means commercial use, and a code of **I** means industrial use. Any other code should be treated as an error.

The rates are computed as follows:

R: \$6.00 plus \$0.052 per kwh used

C: \$60.00 for the first 1000 kwh and \$0.045 for each additional kwh

I: Rate varies depending on time of usage:

Peak hours: \$76.00 for first 1000 kwh and \$0.065 for each additional kwh

Off-peak hours: \$40.00 for first 1000 kwh and \$0.028 for each additional kwh

Your program should prompt the user to enter an integer account number, the use code (type **char**), and the necessary consumption figures in whole numbers of kilowatt-hours. Your program should display the amount due from the user.

Question	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
Total:	100	