

CIS*1500 W16 – Assignment #1

Due: Friday January 29, 3pm.

Upload the first 6 questions in a TYPED document in .pdf or .txt format.

Upload your C program for question 7 separately.

1. [4 marks] Provide a series of `printf` statements to output the following:

```
x "hi" x
x *hi* x
x \hi\ x
x %hi% x
```

Solution:

```
printf("x \"hi\" x \n");
printf("x *hi* x \n");
printf("x \\hi\\ x \n");
printf("x %%hi%% x \n");
```

2. [5 marks] True or False

- (a) Every C program must have a function called `main`.
- (b) Every C program must include the line `#include <stdio.h>`
- (c) Variable names are not case sensitive. Thus the identifiers `radius` and `Radius` refer to the same variable.
- (d) There is a limit to the maximum value that can be stored in an integer variable.
- (e) A variable represents a memory location used to store data.

Solution: True, False, False, True, True

3. [5 marks] Which of the following are valid C identifier names for variables?

HiThere	last name	single	union
double	triple	under_score	intersection
_score	name123	123name	unless
j&p	ALLCAPS	john.smith	iAMhere#8

Solution:

HiThere	triple	single	intersection
_score	name123	under_score	unless
	ALLCAPS		

4. [5 marks] **True or False**, the following statements follow valid C syntax:

- (a) `#DEFINE PI 3.14`
- (b) `#define pi 3.145;`
- (c) `c = a%b;`
- (d) `a+b = c;`
- (e) `a+=5;`

Solution: False, True (but *pi* not the value you might think!), True, False, True

5. [4 marks] **Output Art:** Provide a series of at least 5 `printf` statements to produce a visually pleasing output. If your creativity is low, output the first 3 characters of your name.

Solution: (low creativity – add to a C program to see what it really looks like)

```
printf("JJJJJ 00000 EEEEE \n");
printf("  J   0   0 E     \n");
printf("  J   0   0 EEE   \n");
printf("J J   0   0 E     \n");
printf("JJJ   00000 EEEEE \n");
```

6. [8 marks] You are designing a new online census. As part of the interface, you wish to display how old the user is in terms of both years and months. For example, if the current day is Jan 25, 2011 and the user is born on Jan 26, 2001, then you want to display: “You are 9 years old and have been alive for 119 months”. But currently you do not have any information about the user. How can you get and display this information?

- (a) What are the inputs and outputs required in this problem?
- (b) What are the subproblems that should be considered when designing an algorithm?
- (c) Design an algorithm (pseudocode) for this problem.

Solution:

(a) **Inputs:** users birthday and current day. (Better if each described as: day, month, year).
Outputs: years and months person has been alive.

(b) **Subproblems:** (1) Obtain input, (2) compute number of years alive, (3) compute number of months alive, (4) produce output.

(c)

▷ Acquire birthday inputs: *b_day*, *b_month*, *b_year*

▷ Acquire current date: *c_day*, *c_month*, *c_year*

▷ Compute number of years alive. There are 4 cases (could be expressed as 2 or 3)

- if $b_month < c_month$ then $tot_years = c_year - b_year$
 - if $b_month = c_month$ and $b_day \leq c_day$ then $tot_years = c_year - b_year$
 - if $b_month = c_month$ and $b_day > c_day$ then $tot_years = c_year - b_year - 1$
 - if $b_month > c_month$ then $tot_years = c_year - b_year - 1$
- ▷ Compute number of months alive
- if $b_day \leq c_day$ then $tot_months = 12*(c_year - b_year) + (c_month - b_month)$
 - if $b_day > c_day$ then $tot_months = 12*(c_year - b_year) + (c_month - b_month) - 1$
- ▷ Output "You are tot_years years old and have been alive for tot_months months"
7. [10 marks] Write a C program to compute the area and perimeter of a rectangle. You should prompt the user to enter two integers: the **length** and the **width**. The output should be formatted exactly as follows given the user inputs a length of 15 and width of 4:

The area of the rectangle is 15 x 4 = 60.

The perimeter of the rectangle is equal to (2 x 15) + (2 x 4) = 38.

Include appropriate comments. A marking key for this program is provided separately in the Assignments folder. Upload the C program into the Assignment 1 - Q7 folder using the Courselink Dropbox. Your file **must** be named *username_ass1.c* where *username* is your University username.

Solution:

```

1 //=====
2 // Program code for assignment #1 by Joe Sawada
3 // January 20, 2016
4 //
5 // Computes area and perimeter of a rectangle
6 //=====
7
8 #include <stdio.h>
9
10 int main() {
11
12     int length, width, area, perimeter;
13
14     // Obtain the length and the width
15     printf("Enter the length: ");
16     scanf("%d", &length);
17     printf("Enter the width: ");
18     scanf("%d", &width);
19
20     // Compute the area and the perimeter
21     area = length * width;
22     perimeter = 2*length + 2*width;
23
24     // Output the results
25     printf("The area of the rectangle is %d x %d = %d.\n", length, width, area);
26     printf("The perimeter of the rectangle is equal to (2 x %d) + (2 x %d) = %d.\n",
27           length, width, perimeter);
28 }
```