**CS1010 Programming Methodology**
**Week 9: Characters and Strings**

> Learning is not compulsory…
> neither is survival.
> ~ *W. Edwards Deming*

***To students:***

Many programs for this discussion can be downloaded from cs1010 account. For example, to copy **Week9_Q1.c**, you can type:

```
cp  ~cs1010/discussion/Week9_Q1.c  .
```

Please be reminded that **lab #4 deadline is this Saturday, 6pm**.

## I. Self-exploration (non-examinable)

The questions in this section are meant for your self-study. **They are not likely to be discussed in class**, as we expect you to explore such additional knowledge on your own.

1. Character constants do not only appear in the form of single characters such as 'A' , '8' and '@'. Run the following program **Week9_Q1.c**:

```
#include <stdio.h>

int main(void)
{
   int ch1 = '\062', ch2 = '\x41';

   printf("ch1 = %c; ch2 = %c\n", ch1, ch2);

   return 0;
}
```

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What is the output? Can you deduce the meaning of **'\062'** and **'\x41'**?

2. Run the following program **Week9_Q2.c** and deduce what the **atoi()** function does. Note that you need to include **<stdlib.h>** to use **atoi()**.

```
#include <stdio.h>
#include <stdlib.h>

int main(void)
{
   char str[10];
   int value;

   printf("Enter input: ");
   scanf("%s", str);
   value = atoi(str);
```

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```
    printf("Value is %d.\n", value);

    return 0;
}
```

What does **atoi()** convert?

3. Refer to Tables 7.3 and 7.4 in the reference book, or look up the Internet, for the purpose of the function **strtok()**. Write a small program to illustrate its use.

## II. String basics

4.

(a) Assuming that a username can contain up to 8 characters, Brusco wrote this:

```
char username[8];
 . . .
scanf("%s", username);
```

What is wrong with Brusco's code?

(b) What will happen if Brusco writes the following code?

```
char fruitname[8];
 . . .
strcpy(fruitname, "pineapple");
printf("%s\n", fruitname);
```

5. Given the following program **Week9_Q5.c**, what could be the problem?

```
#include <stdio.h>
int main(void)
{
    char board[2][3] = { {'a','b','c'}, {'d','e','f'} };
    int i;

    for (i=0; i<2; i++)
        printf("%s\n", board[i]);

    return 0;
}
```

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6. Given the following program **Week9_Q6.c**, what is the problem?

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```
#include <stdio.h>
#include <string.h>

int main(void)
{
    char *fruit1 = "apple", *fruit2 = "apple";
    char *str1 = "yes", *str2 = "yes";

    fruit1 = str1;
    printf("%s\n", fruit1);

    strcpy(fruit2, str2);
    printf("%s\n", fruit2);
    return 0;
}
```

7. [CS1010 AY2010/2011 Semester 1 Exam, Q2b]

   Write down the output of the following program.

Download source code from cs1010 account for verification after manual tracing

```
#include <stdio.h>

int functionXYZ(char *, char);

int main(void)
{
    char s[] = "abbacadaba";
    printf("%d\n", functionXYZ(s, 'b'));
    return 0;
}

int functionXYZ(char *str, char ch)
{
    int i=0, j=0;
    while (str[i])
        if (str[i++] == ch)
           j++;
    return j;
}
```

## III. Programming on Strings

Download skeleton **Week9_Q8.c** from cs1010 account

8. Write your own version of **strlen()** function and name it **mystrlen()**.

9. [CS1010 AY2010/1 Semester 1 Exam Q5]
   Write a function **void convert_string(char *str, char *dest)** that converts **str** into **dest** by adding an asterisk between each letter in **str**. Any blank space in **str** is also replaced by an asterisk.

   You may assume that there is one blank space between two words, and only letters and spaces appear in **str**. You may also assume that **dest** has sufficient space to hold the lengthened string.

   Download skeleton **Week9_Q9.c** from cs1010 account

   For example, if **str** is

   ```
   The quick brown fox
   ```

   then **dest** will be

   ```
   T*h*e*q*u*i*c*k*b*r*o*w*n*f*o*x
   ```

   The above is an exam question. For this discussion, write a complete program that reads a string with at most 20 characters, and calls the **convert_string()** function.

10. See Week 9 lecture slides: Exercise #4: Hangman Game version 2.
    Modify the program **Week9_Hangman_ver1.c** to **Week9_Q10.c** as follows:

    - Keep a list of 10 words (or more if you like) and randomly choose a word from this list for the user to guess. Each word is at most 15 characters long.
    - Allow user the option to exit the game or continue another game.

11. [CS1101 AY2005/6 Semester 1 Exam Q6] *Pig Latin* is a language game of alterations played in English. We will use a simple version here.

    - For a word starting with a consonant, move that first consonant to the end of the word and append "ay". Examples: "computer" becomes "omputercay", "program" becomes "rogrampay".
    - For a word starting with a vowel, simply append "way" to the word. Examples: "able" becomes "ableway", "only" becomes "onlyway".

    Write a program **Week9_Q11.c** to read in a sentence comprising words in lowercase, and convert the sentence into Pig Latin. You may assume that there is only one space separating two words. You may make other appropriate assumptions.

    A sample run:

    ```
    Enter sentence: my cat likes to eat fish
    Converted: ymay atcay ikeslay otay eatway ishfay
    ```