

C Programming I

2020 Fall

Homework 02

Instructor: Po-Wen Chi

Due: 2020.10.20 PM 11:59

Policies:

- Zero tolerance for late submission.
- You need to prepare a README file about how to make and run your program. Moreover, you need to provide your name and your student ID in the README file.
- For the writing assignment, I only accept pdf. MS. doc/docx format is not acceptable. Moreover, please use Chinese instead of English.
- Do not forget your Makefile. For your convenience, each assignment needs only one Makefile.
- The executable programs should be hw0201, hw0202

1 Discriminant (20 pts)

Given a quadratic polynomial $ax^2 + bx + c$, please determine whether the polynomial has two distinct real roots, one real root or no real roots.

```
1 $ ./hw0201
2 Please enter a quadratic polynomial (a,b,c): 2,3,-4
3 Two distinct real roots.
4 $ ./hw0201
5 Please enter a quadratic polynomial (a,b,c): 1,-4,4
6 One real root.
7 $ ./hw0201
8 Please enter a quadratic polynomial (a,b,c): 1,2,3
9 No real roots.
```

You should give an error message and terminate your program when receiving an invalid input.

2 Intersection (20 pts)

Given two lines, please write a program to find the intersection.

```
1 $ ./hw0202
2 Please enter the first line: (1,1),(-1,-1)
3 Please enter the second line: (1,-1),(-1,1)
4 Intersection: (0,0)
```

If the intersection does not exist, please print an alert message.

3 Income Tax For Foreigners in Taiwan (20 pts)

I do not want to explain too much. Please see the following links.

- <https://www.foreignersintaiwan.com/blog-370963385326684/income-tax-filing-for-expatriates-in-taiwan>

Now please write a program to calculate the income tax for foreigners. You do not need to care the itemized deductions case.

```
1 $ ./hw0203
2 Gross salary: 2500000
3 Married? (0/1): 1
4 How many people are there in your family: 3
5 How many people in your family have income: 2
6 Special Deduction for Savings and Investment: 0
7 Special Deduction for Tuition: 0
8 How many preschool children: 0
9 How many disable people: 0
10 Total tax: 184600
```

You should give an error message and terminate your program when receiving an invalid input.

4 Duration (20 pts)

Please write a program to calculate the time duration between the start date and the end date.

```
1 $ ./hw0204
2 Date Format: YYYY/MM/DD
3 Start Date: 2020/10/07
4 End Date: 2020/10/08
5 Duration: 1 Day(s)
```

You should give an error message and terminate your program when receiving an invalid date.

5 Poker Hands (20 pts)

In poker, players form sets of five playing cards, called hands, according to the rules of the game. Each hand belongs to a category determined by the patterns formed by its cards. A hand in a higher-ranking category always ranks higher than a hand in a lower-ranking category. A hand is ranked within its category using the ranks of its cards. Individual cards are ranked, from highest to lowest: A, K, Q, J, 10, 9, 8, 7, 6, 5, 4, 3 and 2. There are nine categories of hand and I list them in figure 1.

Please write a program to determine the rank of the given five cards. The card is encoded as follows.

- 1-13: ♠ Ace to King.
- 14-26: ♥ Ace to King.
- 27-39: ♦ Ace to King.
- 40-52: ♣ Ace to King.

```
1 $ ./hw0205
2 Please enter 5 cards: 1 2 3 4 5
3 Straight Flush
```

You should give an error message and terminate your program when receiving a set of invalid cards.

6 Bonus: ANSI Escape (10 pts)

I want you to develop a program to print "hello world". Are you kidding me? So simple!! Wait a moment. Please see Figure 2. You can see the second message is **Red**. How could it be? Please write a program to print a colorful "Hello World". Any colors are welcomed. Please also write a document to show me how to do this.

1	Straight flush**	
2	Four of a kind	
3	Full house	
4	Flush**	
5	Straight**	
6	Three of a kind	
7	Two pair	
8	One pair	
9	High card	

Figure 1: Ranking Category.

```
檔案(F) 編輯(E) 檢視(V) 搜尋(S) 終端機(T) 求助(H)
neokent@Banner ~ $ ./a.out
hello world
hello world
neokent@Banner ~ $
```

Figure 2: Colorful Printf.