

計算機概論 作業四

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HW 4-1

(一) 程式碼

1. Version 1

```
#include<stdio.h>

int main(){
    int size; //define variable size
    printf("please enter the size:\n");
    scanf("%d", &size);

    for(int i=size; i<=size && i>0; i--){
        for(int j=size; j>=i; j--){
            printf("*");
        } //end for
        printf("\n");
    } //end for

    return 0; //indicate program ended successfully
} //end function main
```

2. Version 2

```
#include<stdio.h>

int main(){
    int size;
    printf("please enter the size:\n");
    scanf("%d", &size);

    for(int i=1; i<=size; i++){
        for(int j=1; j<=i; j++){
            printf("*");
        }
        printf("\n");
    }
}
```

```
    return 0;
}
```

(二) 輸出結果

```
please enter the size:
10
*
**
***
****
*****
*****
*****
*****
*****
*****
*****
*****
```

HW 4-2

(一) 程式碼

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

int main()
{
    int DoOrNot = 1;
    while(DoOrNot == 1){
        printf("WELCOME! This is the game of \"GUESS THE NUMBER\"\n");
        printf("I have a number between 1 and 100\n");
        printf("Can you guess my number?\n");

        srand(time (NULL)); //設定亂數種子
        int rnum = rand() % 100 + 1; //產生範圍 1~100 的亂數
        int gNum, gtime = 1, min = 1, max = 100;

        while(1){
            printf("Please type your guess (enter -1 to end):\n");
            scanf("%d", &gNum);
```

```

        if(gNum == -1) { //若輸入-1，則結束遊戲
            DoOrNot = 0;
            break;
        }
        else if(gNum < 1 || gNum > 100){ //若輸入數字不在亂數範圍，則須
重新輸入

            printf("Your number is out of range.\n");
            continue;
        }
        else {
            if(gNum == rnum){
                printf("Excellent! You took %d times to guess my
number!\n", gtime);
                printf("Would you like to play again? (Type 1 to restart
a new game, -1 to end)\n");
                int k;
                scanf("%d", &k);
                if(k == 1) {
                    break;
                }
                if(k == -1) {
                    DoOrNot = 0;
                    break;
                }
            }
            else if(gNum < rnum){
                gtime += 1;
                min = gNum;
                printf("Too low. The answer is in the range of %d ~ %d.
Try again.\n", min, max);
                continue;
            }
            else{
                gtime += 1;
                max = gNum;
                printf("Too high. The answer is in the range of %d ~ %d.
Try again.\n", min, max);
                continue;
            }
        }
    }
}

```

```

    }
}
}
}
printf("-----Bye Bye-----");
return 0;
}

```

(二) 輸出結果

<https://drive.google.com/file/d/1MS8DEuyREgkldcxqWndJbbOJF6YxqTCN/view?usp=sharing>

1. 第一次輸入-1，會顯示 bye bye 並結束遊戲。
2. 第二次輸入為測試遊戲過程，其中在 print 中加入%d~%d，使遊戲者能更清楚地知道目前猜數字的範圍顯示。
猜中系統設定的數字後，按 1 來繼續下一回合遊戲。
3. 第三次輸入先輸入了超過亂數範圍的數字，則會 print 出已超過數字範圍，需重新輸入數字。(在這裡省略了遊戲過程，直接按-1 結束遊戲)。

(三) 延伸討論

1. 一開始在寫 code 時，發現測試時輸入超過亂數範圍的數字，終端機一樣會判定數字 too high 或 too low，於是後來在 code 內加了亂數範圍的判定，若輸入範圍不介於 1~100，則會讓遊戲者重新輸入。
2. 為了避免遊戲者在輸入太多次都未猜中正確數字而忘記先前輸過的數字，於是增加顯示了目前猜到的範圍，讓遊戲者可以很清晰地看到縮小過後的範圍。
例如假如正解為 64，而遊戲者第一次輸入 45，則會顯示” Too low. The answer is in the range of 45 ~ 100. Try again.”

(四) 改編

嘗試使用菜單的形式，一開始列出兩種選擇：1 和-1 供遊戲者開始或退出遊戲，若輸入此二者之外的數字，則會要求重新輸入。

1. 程式碼

(1) Version 1 (使用 switch)

```

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

```

```

int menu(){
    int DOrNOT;
    printf("----- -1: end the
game -----\\n");
    printf("----- 1: start the
game -----\\n");
    scanf("%d", &DOrNOT);

    return DOrNOT;
}

int game(){
    srand(time (NULL) );
    int rnum = rand() % 100 + 1;
    int gtime = 1, max = 100, min = 1;

    while(1){
        int gnum;
        printf("Please type your guess:\\n");
        scanf("%d", &gnum);

        if(gnum < 1 || gnum > 100){
            printf("Your number is out of range.\\n");
            continue;
        }
        else if(gnum == rnum){
            printf("Excellent! You took %d times to guess my number!\\n",
gtime);
            printf("Would you like to play again?\\n");
            break;
        }
        else{
            if(gnum < rnum){
                gtime += 1;
                min = gnum;
                printf("Too low. The answer is in the range of %d ~ %d. Try
again.\\n", min, max);
                continue;
            }
            else{
                gtime += 1;
                max = gnum;
                printf("Too high. The answer is in the range of %d ~ %d. Try
again.\\n", min, max);
                continue;
            }
        }
    }
}

```

```

        }
        else if(gnum > rnum){
            gtime += 1;
            max = gnum;
            printf("Too high. The answer is in the range of %d ~ %d. Try
again.\n", min, max);
            continue;
        }
    }
}
return 0;
}

int main(){
    int DOorNOT = menu();
    switch(DOorNOT){
        case 1:
            printf("WELCOME! This is the game of \"GUESS THE NUMBER\"\n");
            printf("I have a number between 1 and 100\n");
            printf("Can you guess my number?\n");
            game();
            main();
            break;
        case -1:
            printf("bye bye\n");
            break;
        default:
            printf("please type 1 to start the game or you can type -1 to end
this game.\n");
            main();
    }
    return 0;
}

```

(2) Version 2 (使用 while 和 switch)

(switch 內的 break 好像只能用來跳出 switch，但不能跳出迴圈，因此在 case -1 中加入了 return)

```

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

int menu(){
    int DOorNOT;
    printf("----- -1: end the
game -----\\n");
    printf("----- 1: start the
game -----\\n");
    scanf("%d", &DOorNOT);

    return DOorNOT;
}

int game(){
    srand(time (NULL) );
    int rnum = rand() % 100 + 1;
    int gtime = 1, max = 100, min = 1;

    while(1){
        int gnum;
        printf("Please type your guess:\\n");
        scanf("%d", &gnum);

        if(gnum < 1 || gnum > 100){
            printf("Your number is out of range.\\n");
            continue;
        }
        else if(gnum == rnum){
            printf("Excellent! You took %d times to guess my number!\\n",
gtime);
            printf("Would you like to play again?\\n");
            break;
        }
        else{
            if(gnum < rnum){
                gtime += 1;
            }
        }
    }
}

```

```

        min = gnum;
        printf("Too low. The answer is in the range of %d ~ %d. Try
again.\n", min, max);
        continue;
    }
    else if(gnum > rnum){
        gtime += 1;
        max = gnum;
        printf("Too high. The answer is in the range of %d ~ %d. Try
again.\n", min, max);
        continue;
    }
}
return 0;
}

int main(){
    while(1){
        int DOrNOT = menu();
        switch(DOrNOT){
            case 1:
                printf("WELCOME! This is the game of \"GUESS THE NUMBER\"\n");
                printf("I have a number between 1 and 100\n");
                printf("Can you guess my number?\n");
                game();
                break;
            case -1:
                printf("bye bye\n");
                return 0;
                break;
            default:
                printf("please type 1 to start the game or you can type -1 to
end this game.\n");
        }
    }
    return 0;
}

```


(3) Version 3 (使用 while 和 if)

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

int menu(){
    int DOrNOT;
    printf("-----  -1: end the
game  -----\\n");
    printf("-----  1: start the
game  -----\\n");
    scanf("%d", &DOrNOT);

    return DOrNOT;
}

int game(){
    srand(time (NULL) );
    int rnum = rand() % 100 + 1;
    int gtime = 1, max = 100, min = 1;

    while(1){
        int gnum;
        printf("Please type your guess:\\n");
        scanf("%d", &gnum);

        if(gnum < 1 || gnum > 100){
            printf("Your number is out of range.\\n");
            continue;
        }
        else if(gnum == rnum){
            printf("Excellent! You took %d times to guess my number!\\n",
gtime);
            printf("Would you like to play again?\\n");
            break;
        }
        else{

```

```

        if(gnum < rnum){
            gtime += 1;
            min = gnum;
            printf("Too low. The answer is in the range of %d ~ %d. Try
again.\n", min, max);
            continue;
        }
        else if(gnum > rnum){
            gtime += 1;
            max = gnum;
            printf("Too high. The answer is in the range of %d ~ %d. Try
again.\n", min, max);
            continue;
        }
    }
    return 0;
}

int main(){
    while(1){
        int D0orNOT = menu();
        if(D0orNOT == 1){
            printf("WELCOME! This is the game of \"GUESS THE NUMBER\"\n");
            printf("I have a number between 1 and 100\n");
            printf("Can you guess my number?\n");
            game();
        }
        else if(D0orNOT == -1){
            printf("bye bye\n");
            break;
        }
        else{
            printf("please type 1 to start the game or you can type -1 to
end this game.\n");
        }
    }
    return 0;
}

```

```
}
```

2. 輸出結果

```
----- -1: end the game -----
----- 1: start the game -----
2
please type 1 to start the game or you can type -1 to end this game.
----- -1: end the game -----
----- 1: start the game -----
1
WELCOME! This is the game of "GUESS THE NUMBER"
I have a number between 1 and 100
Can you guess my number?
Please type your guess:
50
Too high. The answer is in the range of 1 ~ 50. Try again.
Please type your guess:
30
Too high. The answer is in the range of 1 ~ 30. Try again.
Please type your guess:
15
Excellent! You took 3 times to guess my number!
Would you like to play again?
----- -1: end the game -----
----- 1: start the game -----
1
WELCOME! This is the game of "GUESS THE NUMBER"
I have a number between 1 and 100
Can you guess my number?
```

```
Please type your guess:
103
Your number is out of range.
Please type your guess:
50
Too low. The answer is in the range of 50 ~ 100. Try again.
Please type your guess:
70
Too low. The answer is in the range of 70 ~ 100. Try again.
Please type your guess:
85
Too high. The answer is in the range of 70 ~ 85. Try again.
Please type your guess:
80
Too high. The answer is in the range of 70 ~ 80. Try again.
Please type your guess:
75
Too high. The answer is in the range of 70 ~ 75. Try again.
Please type your guess:
73
Too low. The answer is in the range of 73 ~ 75. Try again.
Please type your guess:
74
Excellent! You took 7 times to guess my number!
Would you like to play again?
----- -1: end the game -----
----- 1: start the game -----
-1
bye bye
```