

# 計算機概論 作業三

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## HW 3-1

### (一) 程式碼

```
#include<stdio.h>
int main()
{
    int a, b, c, temp;
    printf("please enter the three lengths of triangle:\n");
    scanf("%d%d%d", &a, &b, &c);
    printf("Before sorting: %d %d %d\n", a, b, c);

    //compare a and b and c(由大到小排列)
    if (a < b){
        temp = a; a = b; b = temp;
    }
    if (a < c){
        temp = c; c = a; a = temp;
    }
    if (b < c){
        temp = c; c = b; b = temp;
    }
    printf("After sorting: %d %d %d\n", a, b, c);

    //判別三角形
    if (b + c > a){
        if(a == b && a == c){
            printf("It's a equilateral triangle!\n");
        }
        else if(a == b || b == c || a == c){
            printf("It's an isosceles triangle!\n");
        }
        else if(a*a == b*b + c*c){
            printf("It's a right triangle!\n");
        }
        else{
```

```

        printf("It's just an ordinary triangle!\n");
    }
}
else{
    printf("It's not a triangle!\n");
}

return 0;
}

```

## (二) 輸出結果

1. 三邊長分別為 3、4、5，為直角三角形。

```

please enter the three lengths of triangle:
3 4 5
Before sorting: 3 4 5
After sorting: 5 4 3
It's a right triangle!

```

2. 三邊長分別為 5、6、6，為等腰三角形。

```

please enter the three lengths of triangle:
5 6 6
Before sorting: 5 6 6
After sorting: 6 6 5
It's an isosceles triangle!

```

3. 三邊長分別為 7、7、7，為正三角形。

```

please enter the three lengths of triangle:
7 7 7
Before sorting: 7 7 7
After sorting: 7 7 7
It's a equilateral triangle!

```

## (三) 延伸討論

1. 假若三邊長改以由小到大排列，其程式為：

```

#include<stdio.h>
int main()
{
    int a, b, c, temp;
    printf("please enter the three lengths of triangle:\n");
    scanf("%d%d%d", &a, &b, &c);
    printf("Before sorting: %d %d %d\n", a, b, c);

    //compare a and b and c(由小到大排列)

```

```

    if (b < a){
        temp = a; a = b; b = temp;
    }
    if (c < a){
        temp = c; c = a; a = temp;
    }
    if (c < b){
        temp = c; c = b; b = temp;
    }
    printf("After sorting: %d %d %d\n", a, b, c);

    //判別三角形
    if (a + b > c){
        if(a == b && a == c){
            printf("It's a equilateral triangle!\n");
        }
        else if(a == b || b == c || a == c){
            printf("It's an isosceles triangle!\n");
        }
        else if(c*c == a*a + b*b){
            printf("It's a right triangle!\n");
        }
        else{
            printf("It's just an ordinary triangle!\n");
        }
    }
    else{
        printf("It's not a triangle!\n");
    }

    return 0;
}

```

2. 先考慮輸入之邊長值是否成立三角形，假若所輸入的邊長值構成三角形的條件，即兩邊之和大於第三邊，會再針對其邊長值判斷其是否為特殊三角形；但假若邊長值無法成立三角形，則會 print 出其不構成一三角形。

以下舉邊長值 1、1、2 為例：

```
please enter the three lengths of triangle:
1 1 2
Before sorting: 1 1 2
After sorting: 1 1 2
It's not a triangle!
```

3. 判別三角形時，使用 if 判斷三角形型態，若非正三角形、等腰三角形及直角三角形，則程式會跑 else 的 statement，並 print 出其為普通三角形。

```
please enter the three lengths of triangle:
5 6 7
Before sorting: 5 6 7
After sorting: 7 6 5
It's just an ordinary triangle!
```

4. 若以倍準浮點數宣告邊長值  
(程式碼)

```
#include<stdio.h>
int main()
{
    double a, b, c, temp;
    printf("please enter the three lengths of triangle:\n");
    scanf("%lf%lf%lf", &a, &b, &c);
    printf("Before sorting: %4.2f %4.2f %4.2f\n", a, b, c);

    //compare a and b and c
    if (a < b){
        temp = a; a = b; b = temp;
    }
    if (a < c){
        temp = c; c = a; a = temp;
    }
    if (b < c){
        temp = c; c = b; b = temp;
    }
    printf("After sorting: %4.2f %4.2f %4.2f\n", a, b, c);

    //判別三角形
    if (b + c > a){
        if(a == b && a == c){
            printf("It's a equilateral triangle!\n");
        }
    }
}
```

```

    }
    else if(a == b || b == c || a == c){
        printf("It's an isosceles triangle!\n");
    }
    else if(a*a == b*b + c*c){
        printf("It's a right triangle!\n");
    }
    else{
        printf("It's just an ordinary triangle!\n");
    }
}
else{
    printf("It's not a triangle!\n");
}

return 0;
}

```

(輸出結果) 設其邊長為 12.4、12.4、18.62

```

please enter the three lengths of triangle:
12.4 12.4 18.62
Before sorting: 12.40 12.40 18.62
After sorting: 18.62 12.40 12.40
It's an isosceles triangle!

```

## 5. 使用 pow() 函數進行指數運算

```

#include<stdio.h>
#include<math.h>
int main()
{
    int a, b, c, temp;
    printf("please enter the three lengths of triangle:\n");
    scanf("%d%d%d", &a, &b, &c);
    printf("Before sorting: %d %d %d\n", a, b, c);

    //compare a and b and c(由大到小排列)
    if (a < b){
        temp = a; a = b; b = temp;
    }
    if (a < c){

```

```

        temp = c; c = a; a = temp;
    }
    if (b < c){
        temp = c; c = b; b = temp;
    }
    printf("After sorting: %d %d %d\n", a, b, c);

    //使用 pow 進行指數運算
    int d = pow(a, 2);
    int e = pow(b, 2);
    int f = pow(c, 2);

    //判別三角形
    if (b + c > a){
        if(a == b && a == c){
            printf("It's a equilateral triangle!\n");
        }
        else if(a == b || b == c || a == c){
            printf("It's an isosceles triangle!\n");
        }
        else if(d == e + f){
            printf("It's a right triangle!\n");
        }
        else{
            printf("It's just an ordinary triangle!\n");
        }
    }
    else{
        printf("It's not a triangle!\n");
    }

    return 0;
}

```

## HW 3-2

### (一) 程式碼

```
#include<stdio.h>
int main()
{
    double price, salary;
    printf("please enter hourly rate of worker($00.00):\n");
    scanf("%lf", &price);

    int worker = 1;

    while(worker <= 4){
        int hour;
        printf("please enter the working hours(-1 to end):\n");
        scanf("%d", &hour);

        if(hour <= 40 && hour != -1){
            salary = hour * price;
            printf("Salary is $%.2f\n", salary);
        }
        else if(hour > 40 && hour != -1){
            salary = 40 * price + (hour - 40)*1.5* price;
            printf("Salary is $%.2f\n", salary);
        }
        else{
            printf("while end\n");
        }
        worker++;
    }

    return 0;
}
```

### (二) 輸出結果

- a) 第一個人：工作 38 小時，每小時 20 元。
- b) 第二個人：工作 42 小時，每小時 20 元。
- c) 第三個人：工作 52 小時，每小時 20 元。
- d) 第四個人：在工作小時輸入-1，結束迴圈。

```
please enter hourly rate of worker($00.00):
20
please enter the working hours(-1 to end):
38
Salary is $760.00
please enter the working hours(-1 to end):
42
Salary is $860.00
please enter the working hours(-1 to end):
52
Salary is $1160.00
please enter the working hours(-1 to end):
-1
while end
```

### (三) 延伸討論

#### 1. 改使用 for 迴圈

(程式碼)

```
#include<stdio.h>
int main()
{
    double price, salary;
    printf("please enter hourly rate of worker($00.00):\n");
    scanf("%lf", &price);

    for(int i=1; i<=4; i++){
        int hour;
        printf("please enter the working hours(-1 to end):\n");
        scanf("%d", &hour);

        if(hour <= 40 && hour != -1){
            salary = hour * price;
            printf("Salary is $%.2f\n", salary);
        }
        else if(hour > 40 && hour != -1){
            salary = 40 * price + (hour - 40)*1.5* price;
            printf("Salary is $%.2f\n", salary);
        }
        else{
            printf("while end\n");
        }
    }
}
```



```
    return 0;  
}
```

(輸出結果)

```
Salary is $760.00  
please enter the working hours(-1 to end):  
42  
Salary is $860.00  
please enter the working hours(-1 to end):  
52  
Salary is $1160.00  
please enter the working hours(-1 to end):  
-1  
while end
```