Homework 2

1. Write a program that prompts for and reads a floating-point value. The program prints the whole part on one line and the decimal (fraction) part on a second line. **Use ONE variable only**
   For example, if the input value is 123.456, it would print the output:
   the input value is 123.456
   the whole part is 123
   the decimal(fraction) part is 0.456

   Input/Output Example:
   Input: 123.456
   Output:
   The whole part is 123
   The decimal part is 0.456

   Hint: **Casting 轉型** (**truncated**, not round off)
   scanf("%lf",&number);
   printf("The whole part=%d\n", **(int) number**);

2. Write a program that asks the user to enter two real numbers (with type double), and calculate the sum, product, difference, and quotient of the two numbers in following data types.

   a. Please declare two double variables for user input.

   b. And then declare two int variables and float variables, assign values of the double variables to these int/float variables to calculate the sum, product, difference, and quotient of the required cases.

   c. Please use format specifier in printf() to meet the required output format shown in following cases:

	Number1	Number2
Case I	int	int
Case II	float	float
Case III	double	double
Case VI	int	float

Consider and discuss the results.
Compare the precision of Case II, Case III, and Case VI.
Please adjust these three cases to the correct order and replace the output "?" by ">", "<" or "=" **in the last line**.

Input/Output Example:

```
Input two numbers: 1.234 5.678

12345678901234567890123456789012345678901234567890123456789012345678901|
             sum   |   product   | difference |   quotient   |
Case 1:          6|           5|          -4|            0|
Case 2:  6.91199970|  7.00665188| -4.44400024|  0.2173300385|
Case 3:  6.91200000|  7.00665200| -4.44400000|  0.2173300458|
Case 4:  6.67799997|  5.67799997| -4.67799997|  0.1761183590|
Precision: Case 2 ? Case 3 ? Case 4.
```

Hint:

```
printf("\n12345678901234567890123456789012345678901234567890123456789012345678901|\n");
…
printf("Case 1: %12d|%12d|%12d|%14d|\n",…);
printf("Case 2: %12.8f|%12.8f|%12.8f|%14.10f|\n",…);
…
```

3. Write a program that accepts an integer between 7 and 9 digits long.
   a. Extracts and prints the **fifth-rightmost** digit of the input data.
   b. Writes the integer with **commas** between **every third digits** starting from the right.

   Use **only one variable** to complete this problem.

Input/Output Example:

```
Please input 7-9 digit number: 1234567
Output:
The fifth-rightmost digit of the input data is 3
The input data with commas between every fifth digits is 1,234,567
-------------------------------
```

Hint:

%05d says:

(a)."Print the variable as a decimal integer in a field width of 5 columns".

(b). If the data to be printed happens to **not to fill up the entire field**, the value is right justified(靠右對齊) and is **padded with 0s on the left**.

```
printf("Please input 7-9 digit number: ");
 …
printf("Output:\nThe fifth-rightmost digit of the input data is %d\n", … );
printf("The input data with commas between every third digits is ……);
```

4. Write a program to calculate the diameter, the circumference, and the area of a circle with a radius of 6.75.

Assign the radius of data type "**float**" variable, and then output the radius with an appropriate message. Declare a named const PI with the value 3.14159.

The program should output the diameter, the circumference, and the area, each on a separate line. **Print each value to 10 decimal places within a total field width(欄位) of 15**.

Consider and discuss the results.
Use "**double**" for the radius variable and **try again**.

Hint: **when the compiler reads this specifier: %10.5f**

i. **The compiler prepares 10 columns to output this real number with the five right-most columns for the fraction part.**
ii. **If the real number has less than five digits in the fraction part, the compilers pads the remaining columns with zero.**
iii. **The 6th column from the right is the decimal point.**
iv. **The remaining four columns are the integer part. If the real number has less than four digits in the integer part, the output is padded with blank on the left.**

%10.5f 的意思: 這個 format 對應的 data 其輸出格式如下:
留十個欄位來輸出實數，其中後五個欄位為小數點後面的位數，不足五位則在後方補「0」，後面數來第六位數是小數點，剩下四位放整數，整數不足四位則在前方插入空白。

Input/Output Example: for "float" radius

```
Input Radius : 2.7
1234567890123456789012345678901234567890
Diameter     :      5.4000001
Circumference:     16.9645863
Area         :     22.9021919
```

Input/Output Example: for "double" radius

```
Input Radius : 2.7
1234567890123456789012345678901234567890
Diameter     :      5.4000000
Circumference:     16.9645860
Area         :     22.9021911
```

5. The effective resistance of a parallel circuit with five parallel resistances is given by:

$$R_p = \frac{1}{1/R1 + 1/R2 + 1/R3 + 1/R4 + 1/R5}$$

Connect above circuit with two more resistors in series.
The resistance is given by: $R = R_p + R_6 + R_7$

Read these five resistances from the keyboard and calculate the effective resistance R_p. Read R6 and R7 from the keyboard and calculate the effective resistance R. Print the answer to the 7th decimal place.

TWO variables only:
One int variables for input resistance
the other double variable for the effective resistance R

Input/Output Example:

```
Input r1 r2 r3 r4 r5: 1.1 2.2 3.3 4.4 5.5
Effective parallel resistance: 0.4817518
Input r6 r7: 6.6 7.7
Effective total resistance: 14.7817518
```

6. Solve a set of simultaneous equations:

$ax + by = c$
$dx + ey = f$

Input data: six real numbers.
Formulas for the solution:

$$x = \frac{ce - bf}{ae - bd}$$

$$y = \frac{af - cd}{ae - bd}$$

Output all the input values *a*, *b*, *c*, *d*, *e*, and *f* and the computed values for *x* and *y*. Print these values with total field width 10 and to the 5th decimal place.

Input/Output Example:

```
Input a b c d e f: 11.22 34.56 77.88 90.11 23.45 67.89

12345678901234567890123456789012345678901234567890123456789
a =    11.22000 b =    34.56000 c =    77.88000
d =    90.11000 e =    23.45000 f =    67.89000
x =     0.18238 y =     2.19426
```