# Lab 1 Exercises (Variables and Conditional Structure)

1. Write a program that prompts the user to enter the number of days and displays the number of years and months corresponding to that number of days. For simplicity, assume a year has 365 days and one month has 30 days.

   Here is a sample:

```
Enter the number of days: 400
years =  1
months =  1
days =  5
```

2. Write a program that reads in an investment amount, the annual interest rate, and the number of years, and displays the future investment value.

   Here is the formula:

$$futureInvestmentValue = investmentAmount \times (1 + monthlyInterestRate)^{numberOfMonths}$$

   For example, if you enter the amount 1000, an annual interest rate of 4.25%, and the number of years as 1, the future investment value is 1043.33. Here is a sample run:

```
Enter investment amount: 1000 Enter
Enter annual interest rate: 4.25 Enter
Enter number of years: 1 Enter
Accumulated value is 1043.33
```

3. If you know the balance and the annual percentage interest rate, you can compute the interest on the next monthly payment. Here is the formula:

$$interest = balance * (annualInterestRate / 1200)$$

   Write a program that reads the balance and the annual percentage interest rate and displays the interest for the next month. Here is a sample run:

```
Enter balance and interest rate (e.g., 3 for 3%): 1000, 3.5 Enter
The interest is 2.91667
```

4. Suppose you save $100 each month into a savings account with an annual interest rate of 5%.

   Therefore, the monthly interest rate is **0.00417 (**0.05/12 = 0.00417**)**.

   - After the first month, the value in the account becomes **100 * (1 + 0.00417) = 100.417**.
   - After the second month, the value in the account becomes **(100 + 100.417) * (1 + 0.00417) = 201.252**
   - After the third month, the value in the account becomes **(100 + 201.252) * (1 + 0.00417) = 302.507**.

   Write a program that prompts the user to enter a monthly saving amount and displays the account value after the sixth month. Here is a sample run of the program:

```
Enter the monthly saving amount: 100 Enter
After the sixth month, the account value is 608.81
```

5. (*Sort three integers*) Write a program that prompts the user to enter three integers and displays them in increasing order. The sample is run as following:

```
Enter three integers: 25,10,32
The sorted numbers are 10 25 32
```

6. Write a program that reads an integer between 0 and 1000 and adds all the digits in the integer.

   For example, if an integer is 932, the sum of all its digits is 14.

   **Hint**: Use the % operator to extract digits, and use the // operator to remove the extracted digit. For instance, 932 % 10 = 2 and 932 // 10 = 93. Here is a sample:

```
Enter a number between 0 and 1000: 999 Enter
The sum of the digits is 27
```

7. (*Check a number*) Write a program that prompts the user to enter an integer and checks whether the number is divisible by both **5** and **6**, divisible by **5** or **6**, or just one of them (but not both). The sample is run as following:

```
Enter an integer: 10 Enter
Is 10 divisible by 5 and 6? False
Is 10 divisible by 5 or 6? True
Is 10 divisible by 5 or 6, but not both? True
```

8. (*Financials: currency exchange*) Write a program that prompts the user to enter the currency exchange rate between U.S. dollars and Chinese Renminbi (RMB). Prompt the user to enter **0** to convert from U.S. dollars to Chinese RMB and **1** for vice versa. Prompt the user to enter the amount in U.S. dollars or Chinese RMB to convert it to Chinese RMB or U.S. dollars, respectively. The sample is run as following:

```
Enter the exchange rate from dollars to RMB: 6.81 Enter
Enter 0 to convert dollars to RMB and 1 vice versa: 1 Enter
Enter the RMB amount: 10000 Enter
10000.0 yuan is $1468.43
```

```
Enter the exchange rate from dollars to RMB: 6.81 Enter
Enter 0 to convert dollars to RMB and 1 vice versa: 0 Enter
Enter the dollar amount: 100 Enter
$100.0 is 681.0 yuan
```

```
Enter the exchange rate from dollars to RMB: 6.81 Enter
Enter 0 to convert dollars to RMB and 1 vice versa: 5 Enter
Incorrect input
```

9. *(Financial: compare costs)* Suppose you shop for rice and find it in two different-sized packages. You would like to write a program to compare the costs of the packages. The program prompts the user to enter the weight and price of each package and then displays the one with the better price. Here is a sample run:

```
Enter the weight and price for package 1: 50, 24.59
Enter the weight and price for package 2: 25, 11.99
Package 2 has the better price.
```