資工系計算機程式設計實習Lab 2

1. (Currency exchange) Write a program that prompts the user to enter the exchange rate from currency in U.S. dollars (USD) to new Taiwan dollars (NTD), Prompt the user to enter 0 to convert from USD to NTD and 1 to convert from NTD to USD. Prompt the user to enter the amount in USD or NTD to convert it to NTD or USD, respectively. Here is a sample run:

Enter the exchange rate from USD to NTD: 31.2

Enter 0 to convert USD to NTD and 1 vice versa: 0

Enter the USD amount: 100

$100.0 USD is 3120 NTD.

1. **(Separating Digits in an Integer)** Write a program that inputs one five-digit number, separates the number into its individual digits and prints the sum of the digits. For example,

Input: 93215

Output: The sum of the digits is 20.

[Hint: Use combinations of integer division and the remainder operation.]

1. (Points in triangle) Suppose a right triangle is placed in a plane. The right-angle point is placed at (0, 0), and the other two points are placed at (200, 0) and (0, 100). Write a program that prompts the user to enter a point with x- and y-coordinates and determines whether the point is inside the triangle.

Here are the sample runs:

Enter a point’s x- and y-coordinates: 100.5 25.5

The point is in the triangle

Enter a point’s x- and y-coordinates: 100.5 50.5

The point is not in the triangle

1. (Palindrome Tester) A palindrome is a number or a text phrase that reads the same backward as forward. For example, each of the following five-digit integers is a palindrome: 12321, 55555, 45554 and 11611. Write a program that reads in a five-digit integer and determines whether or not it is a palindrome. [Hint: Use the division and remainder operators to separate the number into its individual digits.]
2. The body mass index(BMI) can be calculated as follows:

Create a BMI calculator application that reads the user’s weight in kilograms and height in meters, then calculates and displays the user’s body mass index. Also, the application should display the following information so the user can evaluate his/her BMI:

BMI VALUES

Underweight: less than 18.5

Normal: between 18.5 and 24.9

Overweight: between 25 and 29.9

Obese: 30 or greater

1. Given a directed line from point p0(x0, y0) to p1(x1, y1), you can use the following condition to decide whether a point p2(x2, y2) is on the left of the line, on the right, or on the same line:

Write a program that prompts the user to enter the coordinates for the three points p0, p1, and p2. Display whether p2 is on the left of the line from p0 to p1, on the right, or on the same line. Here are some sample runs:

Enter the coordinate (x, y) for p0: 4.4 2

Enter the coordinate (x, y) for p1: 6.5 9.5

Enter the coordinate (x, y) for p2: -5 4

(-5.0, 4.0) is on the left side of the line from (4.4, 2.0) to (6.5, 9.5)

Enter the coordinate (x, y) for p0: 1 1

Enter the coordinate (x, y) for p1: 5 5

Enter the coordinate (x, y) for p2: 2 2

(2.0, 2.0) is on the line from (1.0, 1.0) to (5.0, 5.0)

1. Zeller’s congruence is an algorithm developed by Christian Zeller to calculate the day of the week. The formula is

where

* *h* is the day of the week (0: Saturday, 1:Sunday, 2:Monday, 3:Tuesday, 4:Wednesday, 5:Thursday, and 6:Friday).
* *q* is the day of the month
* *m* is the month (3:March, 4:April, …, 12:December). January and February are counted as months 13 and 14 of the previous year.
* *j* is .
* *k* is the year of the century (i.e., year % 100).

Note all divisions in this problem perfrom an integer division. Write a program that prompts the user to enter a year, month, and day of the month, and display the name of the day of the week.

[Hint: January and February are counted as 13 and 14 in the formula, so you need to convert the user input 1 to 13 and 2 to 14 for the month and change the year to the previous year. For example, if the user enters 1 for m and 2015 for year, m will be 13 and year will be 2014 used in the formula.]

Here are some sample runs:

Enter year: 2015

Enter month (1-12): 1

Enter the day of the month (1-31): 25

Day of the week is Sunday

Enter year: 2012

Enter month (1-12): 5

Enter the day of the month (1-31): 12

Day of the week is Saturday

1. Write a program that prompts the user to enter the center coordinates and radii of two circles and determines whether the second circle is inside the first or overlaps with the first as shown in the following figures:

Inside

Overlap

[Hint: circle2 is inside circle1 if the distance between the two center <=r1-r2 and circle2 overlaps circle1 if the distance between the two center <= r1+r2]

Here are the sample runs:

Enter circle1’s center x-, y-coordinates, and radius: 0.5 5.1 13

Enter circle2’s center x-, y-coordinates, and radius: 1 1.7 4.5

Circle2 is inside circle1.

Enter circle1’s center x-, y-coordinates, and radius: 3.4 5.7 5.5

Enter circle2’s center x-, y-coordinates, and radius: 6.7 3.5 3

Circle2 is overlap circle1.

Enter circle1’s center x-, y-coordinates, and radius: 3.4 5.5 1

Enter circle2’s center x-, y-coordinates, and radius: 5.5 7.2 1

Circle2 does not overlap circle1.