Introduction to programming

Homework 2

1. (Convert Celsius to Fahrenheit) Write a program that reads a Celsius degree from the console and converts it to Fahrenheit and displays the result. The formula for the conversion is as follows:

fahrenheit = (9 / 5) \* celsius + 32

Here is a sample run of the program:

Enter a degree in Celsius: 43

43 Celsius is 109.4 Fahrenheit

1. (Compute the volume of a cylinder) Write a program that reads in the radius and length of a cylinder and computes the area and volume using the following formulas:

area = radius \* radius \* π volume = area \* length

Here is a sample run:

Enter the radius and length of a cylinder: 5.5, 12

The area is 95.0331 The volume is 1140.4

1. (Convert feet into meters) Write a program that reads a number in feet, converts it to meters, and displays the result. One foot is 0.305 meters. Here is a sample run:

Enter a value for feet: 16.5

16.5 feet is 5.0325 meters

1. (Convert pounds into kilograms) Write a program that converts pounds into kilograms. The program prompts the user to enter a value in pounds, converts it to kilograms, and displays the result. One pound is 0.454 kilograms. Here is a sample run:

Enter a value in pounds: 55.5

55.5 pounds is 25.197 kilograms

1. (Financial application: calculate tips) Write a program that reads the subtotal and the gratuity rate and computes the gratuity and total. For example, if the user enters 10 for the subtotal and 15% for the gratuity rate, the program displays 1.5 as the gratuity and 11.5 as the total. Here is a sample run:

Enter the subtotal and a gratuity rate: 15.69, 15

The gratuity is 2.35 and the total is 18.04

1. (Sum the digits in an integer) 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 run:

Enter a number between 0 and 1000: 999

The sum of the digits is 27

1. (Find the number of years and days) Write a program that prompts the user to enter the minutes (e.g., 1 billion), and displays the number of years and days for the minutes. For simplicity, assume a year has 365 days. Here is a sample run:

Enter the number of minutes: 1000000000

1000000000 minutes is approximately 1902 years and 214 days

1. (Science: calculate energy) Write a program that calculates the energy needed to heat water from an initial temperature to a final temperature. Your program should prompt the user to enter the amount of water in kilograms and the initial and final temperatures of the water. The formula to compute the energy is

Q = M \* (finalTemperature – initialTemperature) \* 4184

where M is the weight of water in kilograms, temperatures are in degrees Celsius, and energy Q is measured in joules. Here is a sample run:

Enter the amount of water in kilograms: 55.5

Enter the initial temperature: 3.5

Enter the final temperature: 10.5

The energy needed is 1625484.0

1. (Science: wind-chill temperature) How cold is it outside? The temperature alone is not enough to provide the answer. Other factors including wind speed, relative humidity, and sunshine play important roles in determining coldness outside. In 2001, the National Weather Service (NWS) implemented the new wind-chill temperature to measure the coldness using temperature and wind speed. The formula is given as follows:



Where ta is the outside temperature measured in degrees Fahrenheit and v is the speed measured in miles per hour. twc is the wind-chill temperature. The formula cannot be used for wind speeds below 2 mph or for temperatures below or above 41°F. Write a program that prompts the user to enter a temperature between and 41°F and a wind speed greater than or equal to 2 and displays the wind-chill temperature. Here is a sample run:

Enter the temperature in Fahrenheit between -58 and 41: 5.3

Enter the wind speed in miles per hour: 6

The wind chill index is -5.56707