



Java Lab

Week 4

IMPORTANT! Save all your work to a safe location such as oneDrive.

Create a folder for SDPD into which you will save all your work for this module, arranged how you wish. Ideally you should create a folder each week for your lab exercises. Note that you should create a separate file for each exercise.

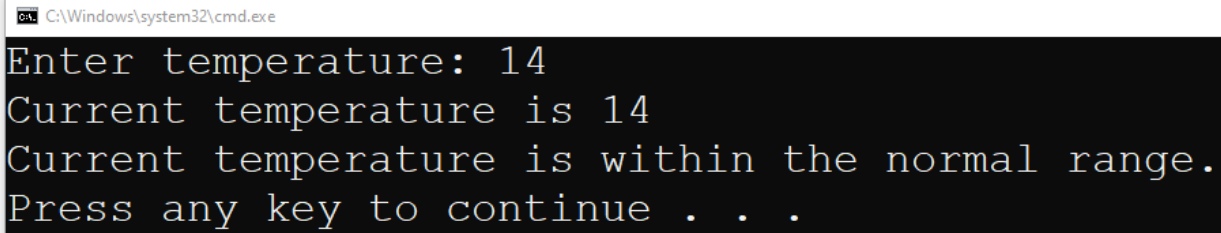
Logical Operators, and comparing Strings

Exercise 1

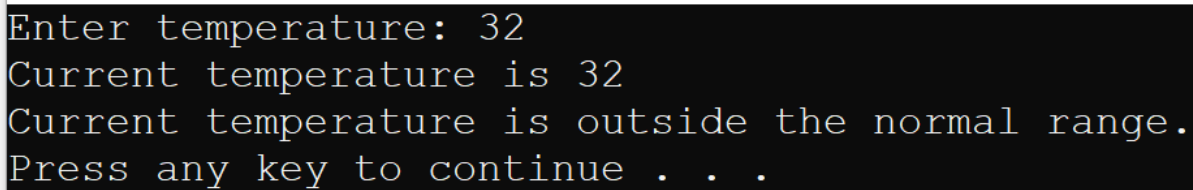
Goal: Create a program in Java, using an if statement and logical operators as required.

Create a new a Java program called JavaLogicalOperators1. Create a variable called temperature and assign the value to it. Write a program that performs the following test using a logical AND operator:

If temperature is greater than -10 and is less than 30, the output should be similar to as shown below:



```
C:\Windows\system32\cmd.exe
Enter temperature: 14
Current temperature is 14
Current temperature is within the normal range.
Press any key to continue . . .
```

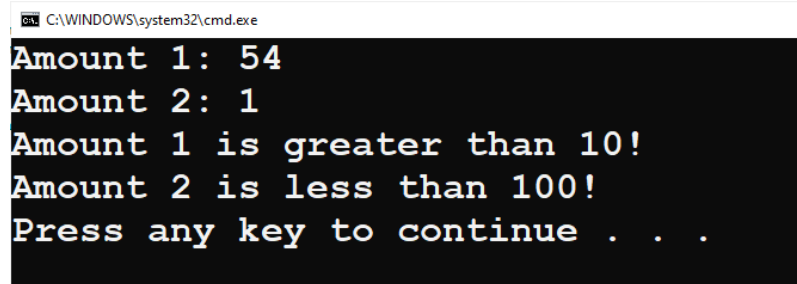


```
C:\Windows\system32\cmd.exe
Enter temperature: 32
Current temperature is 32
Current temperature is outside the normal range.
Press any key to continue . . .
```

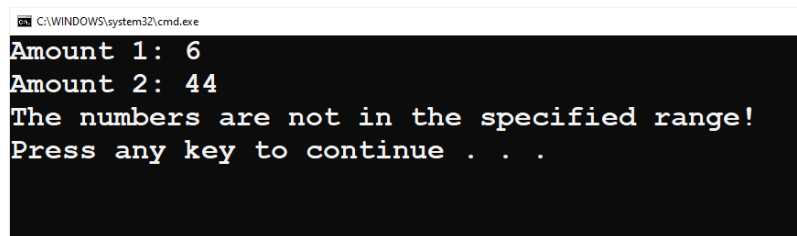
Exercise 2

Create a new Java program called JavaLogicalOperators2. Create two variables called amount1 and amount2. Write a program that performs the following test using a logical **AND** operator:

If amount1 is greater than 10 and amount2 is less than 100, display a message similar to as shown below:



```
C:\WINDOWS\system32\cmd.exe
Amount 1: 54
Amount 2: 1
Amount 1 is greater than 10!
Amount 2 is less than 100!
Press any key to continue . . .
```

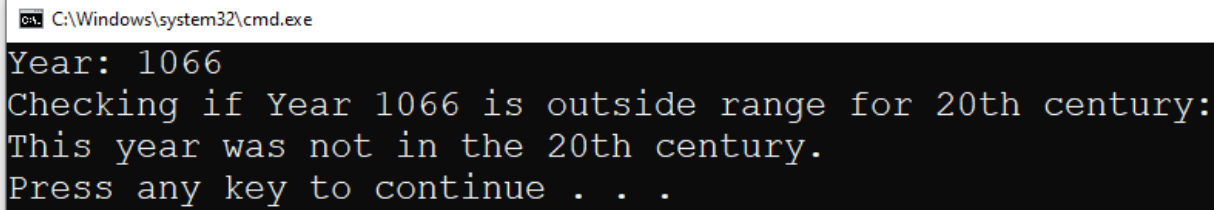


```
C:\WINDOWS\system32\cmd.exe
Amount 1: 6
Amount 2: 44
The numbers are not in the specified range!
Press any key to continue . . .
```

Exercise 3

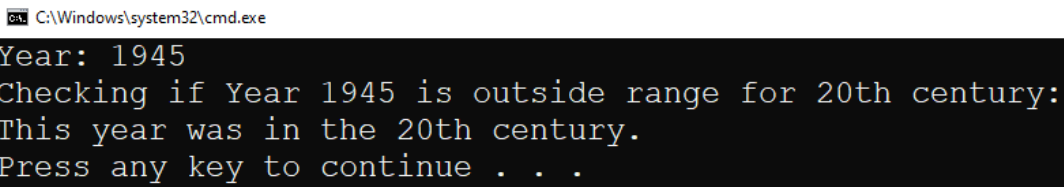
Create a new Java program called JavaLogicalOperators3. Create a variable called year and assign a value to it. Write a program that performs the following test using a logical **OR** operator:

If the variable year is outside the following range – Before 1901 or after 2000, then the output should be similar to as shown below:



```
C:\Windows\system32\cmd.exe
```

```
Year: 1066  
Checking if Year 1066 is outside range for 20th century:  
This year was not in the 20th century.  
Press any key to continue . . .
```



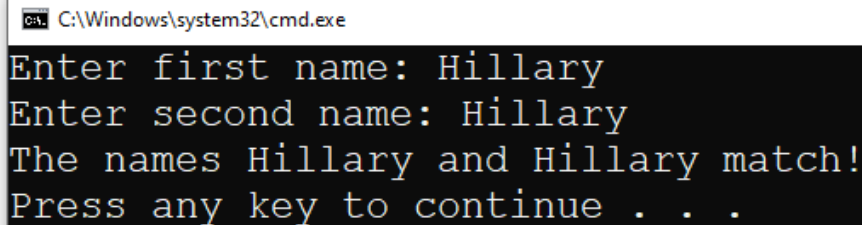
```
C:\Windows\system32\cmd.exe
```

```
Year: 1945  
Checking if Year 1945 is outside range for 20th century:  
This year was in the 20th century.  
Press any key to continue . . .
```

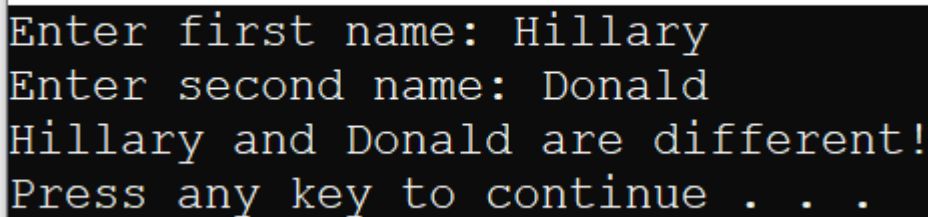
Exercise 4

Goal: Create a program in Java, using an *if* statement to compare two string inputs as required.

Create a new Java program called `JavaStringCompare1`. Create two variables that allow the user to input two names. Write a program that performs the following test using an if statement and the equals method:



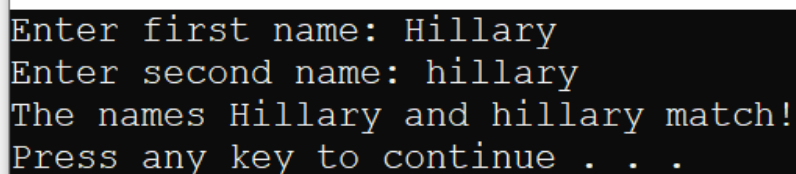
```
C:\Windows\system32\cmd.exe
Enter first name: Hillary
Enter second name: Hillary
The names Hillary and Hillary match!
Press any key to continue . . .
```



```
C:\Windows\system32\cmd.exe
Enter first name: Hillary
Enter second name: Donald
Hillary and Donald are different!
Press any key to continue . . .
```

Amend your program so that it will still compare even if there are capital letters in one and not the other, eg:

Hillary and hillary, by using the *equalsIgnoreCase* method:



```
C:\Windows\system32\cmd.exe
Enter first name: Hillary
Enter second name: hillary
The names Hillary and hillary match!
Press any key to continue . . .
```

Exercise 5

Goal: Create a program in Java, to compare two strings.

Create a new a Java program called JavaStringCompare2. Allow the user to input a String called username, and a String called password. Using a logical AND in your if statement, your program should produce the output shown below. The if statement should check to see if the username is “Bob” and the password is “pass”.

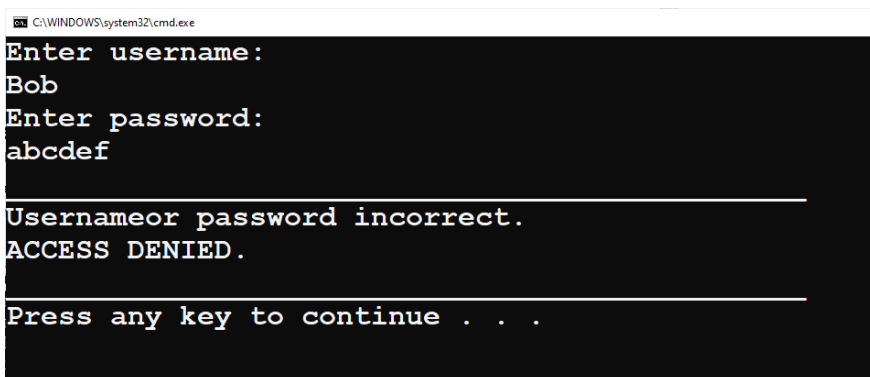


```
C:\WINDOWS\system32\cmd.exe
Enter username:
Bob
Enter password:
pass

SYSTEM ACCESS GRANTED

Press any key to continue . . .
```

If either the username or the password is incorrect, then the following should be output:

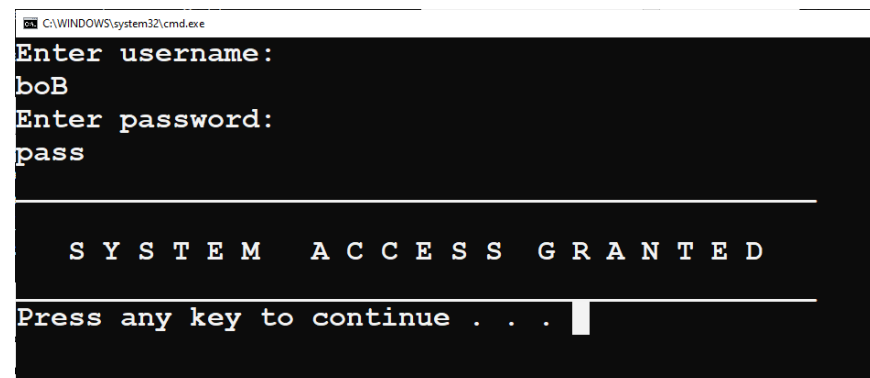


```
C:\WINDOWS\system32\cmd.exe
Enter username:
Bob
Enter password:
abcdef

Username or password incorrect.
ACCESS DENIED.

Press any key to continue . . .
```

Amend your code so that the username is not case sensitive, eg:



```
C:\WINDOWS\system32\cmd.exe
Enter username:
boB
Enter password:
pass

SYSTEM ACCESS GRANTED

Press any key to continue . . .
```

Exercise 6

Goal: Create a program in Java outlined below, using *if* and *else-if* statements (*any format you like*) and any operators you deem suitable.

Write a Java program called ThreeNumbers that prompts the user to input three integers. Your program should then output the largest number, as shown here:

```
C:\WINDOWS\system32\cmd.exe
Input the 1st number: 54
Input the 2nd number: 75
Input the 3rd number: 23
Biggest number is : 75
Press any key to continue . . .
```

Exercise 7

Goal: Create a program in Java outlined below, using *if* statements and any operators as required.

Create a program called UpDown that accepts three numbers from the user and prints "increasing" if the numbers are in increasing order, "decreasing" if the numbers are in decreasing order, and "Neither increasing or decreasing order" otherwise. Your output should be similar to as shown below:

```
C:\WINDOWS\system32\cmd.exe
Input number 1: 23
Input number 2: 36
Input number 3: 78
Numbers are increasing in size!
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
Input number 1: 2345
Input number 2: 567
Input number 3: 3
Numbers are decreasing in size!
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
Input number 1: 34
Input number 2: 2
Input number 3: 568
Numbers are neither increasing or decreasing!
Press any key to continue . . .
```

Exercise 8

Goal: Create a program in Java outlined below, using *if and else-if* statements (*any format you like*) and any operators you deem suitable.

Write a Java program that reads a floating-point number and prints "zero" if the number is zero. Otherwise, print "positive" or "negative". Add "small" if the absolute value of the number is less than 1, or "large" if it exceeds 1,000,000. Output can be similar to as shown:

```
C:\WINDOWS\system32\cmd.exe
Input value: 25
Positive number
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
Input value: 0.251
Positive small number
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
Input value: 0
Zero
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
Input value: -30
Negative number
Press any key to continue . . .
```

Goal: Create a program in Java outlined below, using *if and else-if* statements (*any format you like*) and any operators you deem suitable.

Create a program called SalaryCheck that takes as input of an employee's salary, a rating of the employee's performance and computes the raise for the employee. The performance rating here is being entered as a String—the three possible ratings are "Excellent", "Good", and "Poor" (uppercase or lowercase should be acceptable). An employee who is rated excellent will receive a 6% raise, one rated good will receive a 4% raise, and one rated poor will receive a 1% raise.

```
C:\WINDOWS\system32\cmd.exe
Enter the current salary: 20000
Enter the performance rating (Excellent, Good, or Poor): Good

Current Salary: 20000.0
Amount of your raise: 800.0
Your new salary: 20800.0

Press any key to continue . . .
```


Exercise 10

Goal: Create a program in Java as outlined below, using if statements and any operators you choose as required.

Create a new a Java program called HotelBooking. This will be a Hotel booking system that will calculate the cost based on a room price of €50 and the number of nights the room is required for, from 1 to 7. An example output would be as shown below:

```
C:\Windows\system32\cmd.exe
HOTEL ROOM BOOKING
-----

Enter stay duration (1 to 7 nights): 1
Cost for one night @ 50.0 per night is 50.0 euros
Press any key to continue . . .
```

```
C:\Windows\system32\cmd.exe
HOTEL ROOM BOOKING
-----

Enter stay duration (1 to 7 nights): 4
Cost for four nights @ 50.0 per night is 200.0 euros
Press any key to continue . . .
```

Amend your code so that if the customer presents a valid discount coupon, then a 10% reduction is applied, eg:

```
C:\Windows\system32\cmd.exe
HOTEL ROOM BOOKING
-----

Enter stay duration (1 to 7 nights): 4
Valid Coupon? (y or n)y
Cost for four nights @ 45.0 per night is 180.0 euros
Press any key to continue . . .
```

Amend your program so that a specific discount percentage rate can be applied, eg:

```
C:\Windows\system32\cmd.exe
HOTEL ROOM BOOKING
-----

Enter stay duration (1 to 7 nights): 5
Valid Coupon? (y or n)y
Enter Discount rate: 50
Cost for five nights @ 25.0 per night is 125.0 euros
Press any key to continue . . .
```

The specific discount rate should only be applied if there is a valid coupon

Exercise 11

Goal: Create a program in Java outlined below, using if statements and any operators as required.

Create a new a Java program called BroadbandProviders. This will be a broadband billing system that will calculate the cost a customer will owe based on the following rates:

Package A:

For €9.95 per month, 20 hours of access are provided, and any additional hours are charged at €2.00 per hour.

Write a program that calculates a customer's monthly bill. The program should prompt the user to enter the letter of the package the customer has purchased (package A) and the number of hours that were used. It should then display the total charges.

```
C:\WINDOWS\system32\cmd.exe
Enter customer name:
Bob
Enter Broadband Package (A) :
A
Enter hours used this month:
23
-----
Monthly bill for Bob
-----
Total Hours Used: 23.0
Total Cost is: 15.95
Press any key to continue . . .
```

or

```
C:\WINDOWS\system32\cmd.exe
Enter customer name:
Bob
Enter Broadband Package (A) :
A
Enter hours used this month:
9
-----
Monthly bill for Bob
-----
Total Hours Used: 9.0
Total cost is: 9.95. No extra hours were used
Press any key to continue . . .
```

Amend your program so that an additional package is available as follows:

Package B

For €13.95 per month, 30 hours of access are provided. Additional hours are €1.00 per hour.

```
C:\WINDOWS\system32\cmd.exe
Enter customer name:
Mary
Enter Broadband Package (A or B):
B
Enter hours used this month:
31
-----
Monthly bill for Mary
-----
Total Hours Used: 31.0
Total Cost is: 14.95
Press any key to continue . . .
```

Amend your program so that a third, additional package is available as follows:

Package C

For €29.95 per month, unlimited access is provided.

```
C:\WINDOWS\system32\cmd.exe
Enter customer name:
Jim
Enter Broadband Package (A, B or C):
C
Enter hours used this month:
98
-----
Monthly bill for Jim
-----
Total Hours Used: 98.0
Total cost is: 29.95, all-inclusive
Press any key to continue . . .
```

Exercise 12

Goal: Create a program in Java outlined below, using if statements and any operators as required.

As activity directory at Lake LazyDays Resort in Galway and Athlone, it is your job to suggest appropriate activities to guests based on the weather:

temperature greater than or equal to 20: swimming in Galway, or Sailing in Athlone

temperature between 15 and less than 20: tennis

temperature between 10 and less than 15: golf in Galway, or Angling in Athlone

temperature between 5 and less than 10: hiking

Write a program called ResortActivities that prompts the user for a temperature, then prints out the activity appropriate for that temperature and location. Use an if-else-if structure along with any operators you deem suitable.

```
C:\WINDOWS\system32\cmd.exe
- - W E L C O M E   T O - -
    L A Z Y   D A Y S   R E S O R T
- -   I r e l a n d   - -

Enter current temperature: 21
Enter location: Galway
Activity: Swimming
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
- - W E L C O M E   T O - -
    L A Z Y   D A Y S   R E S O R T
- -   I r e l a n d   - -

Enter current temperature: 12
Enter location: Athlone
Activity: Angling
Press any key to continue . . .
```

Modify your program so that if the temperature is greater than 30 or less than 5, it prints "Visit our shops!". For other temperatures print the activity as before.

```
C:\WINDOWS\system32\cmd.exe
- - W E L C O M E   T O - -
    L A Z Y   D A Y S   R E S O R T
- -   I r e l a n d   - -

Enter current temperature: 3
Enter location: Galway
Visit our gift shop!
Press any key to continue . . .
```

Exercise 13

Create a new Java program called JavaTheRace. Your program asks for the names of three runners and the time, in minutes, it took each of them to finish a race. The program should display the names of the runners in the order that they finished, for example:

C:\Windows\system32\cmd.exe

```
Enter runner 1 name: Donald
Enter runner 1 time: 54
Enter runner 2 name: Joe
Enter runner 2 time: 21
Enter runner 3 name: Hillary
Enter runner 3 time: 34
```

```
Joe was the winner!
Hillary was second!
Donald was third!
Press any key to continue . . .
```

Exercise 14

You have a group of friends coming to visit for your high school reunion, and you want to take them out to eat at a local restaurant. You aren't sure if any of them have dietary restrictions, but your restaurant choices are as follows:

Joe's Gourmet Burgers – Vegetarian: No, Vegan: No, Gluten-Free: No

Main Street Pizza Company –Vegetarian: Yes, Vegan: No, Gluten-Free: Yes

Corner Café – Vegetarian: Yes, Vegan: Yes, Gluten-Free: Yes

Mama's Fine Italian – Vegetarian: Yes, Vegan: No, Gluten-Free: No

The Chef's Kitchen – Vegetarian: Yes, Vegan: Yes, Gluten-Free: Yes

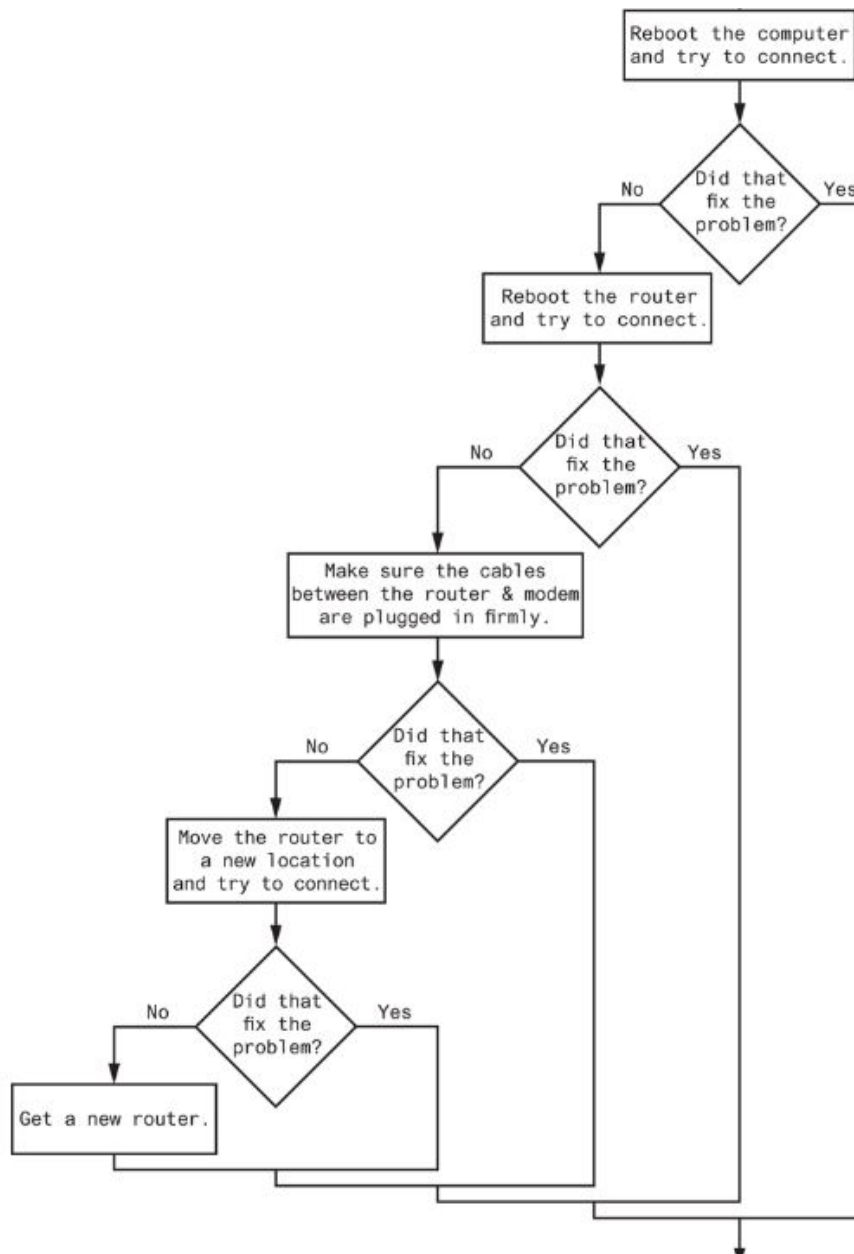
Write a program that asks whether any members of your party are vegetarian, vegan, or gluten-free, and then display only the restaurants that you may take the group to. Here is an example of the program's output:

```
C:\WINDOWS\system32\cmd.exe
This program will help you select a restaurant.
Is anyone in your party a vegetarian? (Enter yes or no): yes
Is anyone in your party a vegan? (Enter yes or no): no
Is anyone in your party gluten free? (Enter yes or no): yes
Here are your restaurant choices:
Main Street Pizza
Corner Cafe
Chef's Kitchen
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
This program will help you select a restaurant.
Is anyone in your party a vegetarian? (Enter yes or no): no
Is anyone in your party a vegan? (Enter yes or no): no
Is anyone in your party gluten free? (Enter yes or no): no
Here are your restaurant choices:
Joe's Gourmet Burgers
Mama's Fine Italian
Main Street Pizza
Corner Cafe
Chef's Kitchen
Press any key to continue . . .
```

Exercise 15

Wi-Fi Diagnostic Tree - The figure below shows a simplified flowchart for troubleshooting a bad Wi-Fi connection. Use the flowchart to create a program that leads a person through the steps of fixing a bad Wi-Fi connection.



Here is an example of the program's output:

```
C:\WINDOWS\system32\cmd.exe
This program will help you diagnose a bad WiFi connection.
Perform this action: Reboot the computer and try to connect.
Did that fix the problem? (Enter yes or no): no
Perform this action: Reboot the router and try to connect.
Did that fix the problem? (Enter yes or no): no
Perform this action: Make sure the cables between the
router and modem are plugged in firmly.
Did that fix the problem? (Enter yes or no): no
Perform this action: Move the router to a new location.
Did that fix the problem? (Enter yes or no): yes
Press any key to continue . . .
```

Or

```
C:\WINDOWS\system32\cmd.exe
This program will help you diagnose a bad WiFi connection.
Perform this action: Reboot the computer and try to connect.
Did that fix the problem? (Enter yes or no): no
Perform this action: Reboot the router and try to connect.
Did that fix the problem? (Enter yes or no): no
Perform this action: Make sure the cables between the
router and modem are plugged in firmly.
Did that fix the problem? (Enter yes or no): no
Perform this action: Move the router to a new location.
Did that fix the problem? (Enter yes or no): no
Get a new router.
Press any key to continue . . .
```


Exercise 16

A local book club awards points to its customers based on the number of books purchased each month.

The points are awarded as follows :

- if a customer purchases no books they earn zero points
- if a customer purchases one book they earn five points
- if a customer purchases two books they earn 15 points
- if a customer purchases three books they earn 30 points
- if a customer purchases four or more books they earn 60 points

Write program called BookClubPoints that asks the user to enter the number of books they have purchased this month and then display the number of points awarded.

Provide two solutions for this : one using an if statement , and one using a switch statement .

```
C:\WINDOWS\system32\cmd.exe
How many books have you purchased this month? 2
You've earned 15 points.
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
How many books have you purchased this month? 6
You've earned 60 points.
Press any key to continue . . .
```

Exercise 17

Goal: Create a program in Java outlined below, using if statements and any operators as required.

Create a new a Java program called BroadbandProviders. This will be a broadband billing system that will calculate the cost a customer will owe based on the following rates:

Package A:

For €9.95 per month, 20 hours of access are provided, and any additional hours are charged at €2.00 per hour.

Write a program that calculates a customer's monthly bill. The program should prompt the user to enter the letter of the package the customer has purchased (package A) and the number of hours that were used. It should then display the total charges.

```
C:\WINDOWS\system32\cmd.exe
Enter customer name:
Bob
Enter Broadband Package (A) :
A
Enter hours used this month:
23
-----
Monthly bill for Bob
-----
Total Hours Used: 23.0
Total Cost is: 15.95
Press any key to continue . . .
```

or

```
C:\WINDOWS\system32\cmd.exe
Enter customer name:
Bob
Enter Broadband Package (A) :
A
Enter hours used this month:
9
-----
Monthly bill for Bob
-----
Total Hours Used: 9.0
Total cost is: 9.95. No extra hours were used
Press any key to continue . . .
```

Amend your program so that and additional package is available as follows:

Package B

For €13.95 per month, 30 hours of access are provided. Additional hours are €1.00 per hour.

```
C:\WINDOWS\system32\cmd.exe
Enter customer name:
Mary
Enter Broadband Package (A or B) :
B
Enter hours used this month:
31
-----
Monthly bill for Mary
-----
Total Hours Used: 31.0
Total Cost is: 14.95
Press any key to continue . . .
```

Amend your program so that a third, additional package is available as follows:

Package C

For €29.95 per month, unlimited access is provided.

```
C:\WINDOWS\system32\cmd.exe
Enter customer name:
Jim
Enter Broadband Package (A, B or C):
C
Enter hours used this month:
98
-----
Monthly bill for Jim
-----
Total Hours Used: 98.0
Total cost is: 29.95, all-inclusive
Press any key to continue . . .
```

Exercise 18

Goal: Create a program in Java outlined below, using if statements and any operators as required.

As activity directory at Lake LazyDays Resort in Galway and Athlone, it is your job to suggest appropriate activities to guests based on the weather:

temperature greater than or equal to 20: swimming in Galway, or Sailing in Athlone

temperature between 15 and less than 20: tennis

temperature between 10 and less than 15: golf in Galway, or Angling in Athlone

temperature between 5 and less than 10: hiking

Write a program called ResortActivities that prompts the user for a temperature, then prints out the activity appropriate for that temperature and location. Use an if-else-if structure along with any operators you deem suitable.

```
C:\WINDOWS\system32\cmd.exe
- - W E L C O M E   T O - -
    L A Z Y D A Y S R E S O R T
- -   I r e l a n d   - -

Enter current temperature: 21
Enter location: Galway
Activity: Swimming
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
- - W E L C O M E   T O - -
    L A Z Y D A Y S R E S O R T
- -   I r e l a n d   - -

Enter current temperature: 12
Enter location: Athlone
Activity: Angling
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
- - W E L C O M E   T O - -
    L A Z Y D A Y S R E S O R T
- -   I r e l a n d   - -

Enter current temperature: 3
Enter location: Galway
Visit our gift shop!
Press any key to continue . . .
```

Exercise 19

The following table shows the Approximate speed of sound in air, water, and steel:

Medium	Speed
Air	1,100 feet per second
Water	4,900 feet per second
Steel	16,400 feet per second

Write program that asks the user to enter air, water or steel, and the distance a sound wave will travel in the medium. The program should then display the amount of time it will take.

You can calculate the amount of time it takes sounds to travel in air with the following formula:

$$\text{time} = \text{distance} / 1,100$$

You can calculate the amount of time it takes sounds to travel in water with the following formula:

$$\text{time} = \text{distance} / 4,900$$

You can calculate the amount of time it takes sounds to travel in steel with the following formula:

$$\text{time} = \text{distance} / 16,400$$

Sample output is as shown:

```
C:\WINDOWS\system32\cmd.exe
Enter one of the following: air, water, or steel: air
Enter the distance the sound wave will travel: 10
It will take 0.00909090909090909 seconds.
Press any key to continue . . .
```

```
C:\WINDOWS\system32\cmd.exe
Enter one of the following: air, water, or steel: water
Enter the distance the sound wave will travel: 40
It will take 0.00816326530612245 seconds.
Press any key to continue . . .
```

C:\WINDOWS\system32\cmd.exe

```
Enter one of the following: air, water, or steel: water
Enter the distance the sound wave will travel: 40
It will take 0.00816326530612245 seconds.
Press any key to continue . . .
```