Paper 2 Revision Session

Topics Covered Today

Key Terminology
Searching and Sorting Algorithms
Logic Gates
SQL
Trace Tables
Reading Algorithms (Flowcharts and pseudocode)

Testing
Defensive Design
Languages
IDE
Producing Algorithms

Searching Algorithms

Explain how a linear search algorithm works:

Explain how a binary search algorithm works:

Show or explain how a linear search algorithm works on the following data.
Target = Computing
Data = ["Science", "Maths","English", "Business", "Computing", "Engineering", "Media"]

Show or explain how a binary search algorithm works on the following data.
Target = 45
Data = [7, 18, 26, 35, 45, 47, 56, 63,]

Why could you **not** perform a binary search on the subject data?

How would you perform a binary search with an odd number of data elements?

Sorting Algorithms

Bubble sort description:

Merge sort description:

Insertion sort description:

Show the stages of performing a bubble sort on the following data:
Data = [12, 7, 14, 23, 20, 35, 28]

Show the stages of performing a merge sort on the following data:
Data = [12, 7, 14, 23, 20, 35, 28]

Show the stages of performing an insertion sort on the following data:
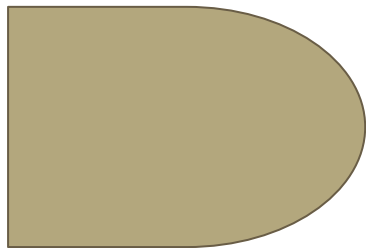Data = [12, 7, 14, 23, 20, 35, 28]

Logic Gates

Name the table where you record the result of logic gates?
Provide an alternative name for logic gates (think data types):
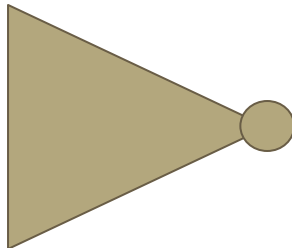
Provide the name of each of the following gates and complete the table and description box underneath to show how they work

Symbol used?

A	B	Z

Symbol used?

A	B	Z

Symbol used?
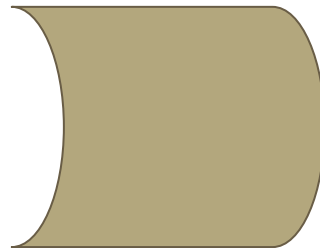
A	B	Z

Completing Tables

Fig. 1 is a circuit diagram.
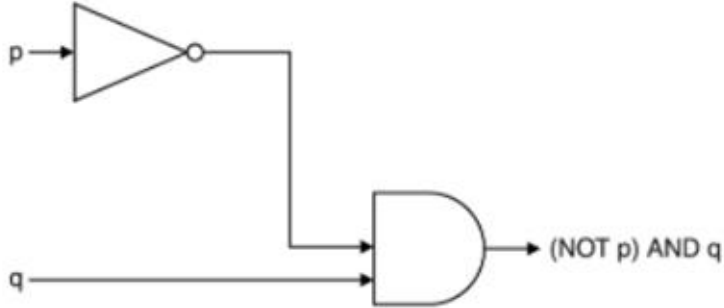
Fig. 1

Complete the truth table for Fig. 1.

p	q	(NOT p) AND q
0	0	0
1	0	0

Drawing Logic gates

A cinema uses the following criteria to decide if a customer is allowed to see a film that has a 15 rating:
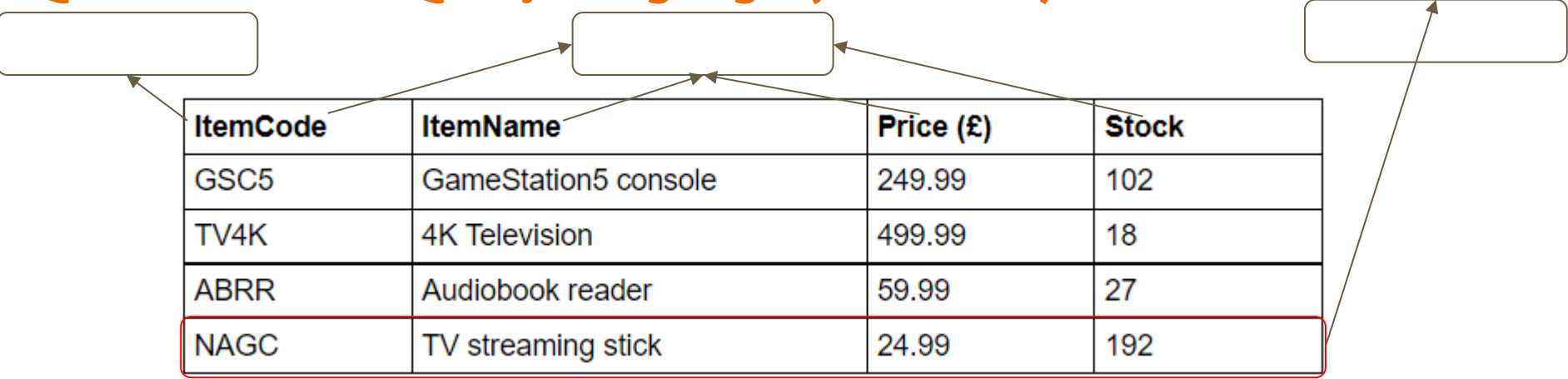
Customers have to be 15 years of age or older to see the film. They also need to either have a ticket or have the money to buy a ticket.

The table shows the inputs to the system that will output whether the customer can watch the film.

Input	Criteria (True / False)
A	The customer is 15 or over
B	The customer has a ticket
C	The customer has the money to buy a ticket

Draw this system using logic gates.

SQL - Structured Query Language (Database)

ItemCode	ItemName	Price (£)	Stock
GSC5	GameStation5 console	249.99	102
TV4K	4K Television	499.99	18
ABRR	Audiobook reader	59.99	27
NAGC	TV streaming stick	24.99	192

SQL requires 3 key terms - what are they?
  1.
  2.
  3.

Write an sql statement to show item name of data with a price greater than 200.00.

* is a wildcard which means what?

Write an sql statement to show item code of data less than 100.00 and more than 100 items in stock.

Testing and defensive design

There are 3 main types of testing which can be carried out on a program. Name all 3 and provide a definition or description of them.
1. N

1. B

1. E   / I

Testing can be carried in one of two ways explain what each method means.

1. Iterative

1. Final/Terminal

Defensive design is about considering the errors that could be made while the program is running and how to stop these errors from happening when designing or creating the program. Explain the two terms below:

1. Anticipating Misuse:

1. Authentication:

1. Input Validation:

Explain how the following maintainability features help when creating a program:
1. Use of sub programs/subroutines:

1. Naming Conventions:

1. Indentation:

1. Commenting:

Languages & Translators

Explain the difference between the two programming languages - High level Language and Low Level Language.

Explain how a Compiler Translator works.

What is the purpose of a translator?

Explain how a Interpreter Translator works.

IDE & Data Types

An Integrated Development Environment is the place where you create your program - you use IDLE. Some tools built into an IDE are listed below - how can they help a programmer develop a program.

1. Editors:

1. Error Diagnostics:

1. Run-time Environment:

1. Translators:

Data Type	Description	Example
S		
I		
R		
B		
C		

Trace Tables

```
x = 15
y = 0
while x > 0
    y = y + 1
    x = x - y
endwhile
print(y)
```


Programming key words & Mathematics

Key Word	Explanation
Sequence	
Selection	
Iteration	
print	
IF/ELIF/ELSE	
while	
for	
array	
2d array	
Subroutine (function & procedure)	

Key Word	Explanation
variable	
constant	
assignment	
identifier	
File handling	
module/library	
MOD	
DIV	
Exponent	
Operators	

Interpreting Algorithms


```
01  swaps = True
02  while swaps
03      swaps = False
04      for p = 0 to queuesize.length-2
05          if queuesize[p] > queuesize[p+1] then
06              temp = queuesize[p]
07              queuesize[p] = queuesize[p+1]
08              queuesize[p+1] = temp
09              swaps = True
10          endif
11      next p
12  endwhile
```
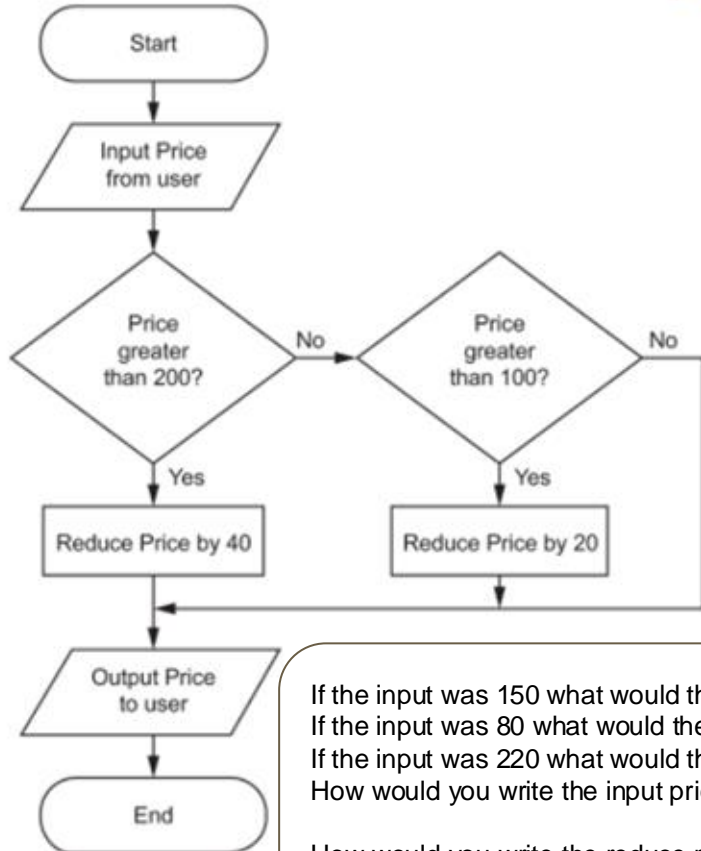
If the input was 150 what would the output be?
If the input was 80 what would the output be?
If the input was 220 what would the output be?
How would you write the input price box in python?

How would you write the reduce price by 20 box in python?

State 2 variables from the program.

On what line does iteration first appear?

On what line does selection first appear?

What is the purpose of swaps?

Do you need to write line 10, 11 and 12?

Explain how line 5 works.

Programming Techniques

Iteration FOR Loops
Create a FOR loop which will display all numbers from from 0 to 100.

Create a FOR loop which will display all numbers from 50 to 500 in steps of 2.

Iteration while loop
Ask the user to enter the best football team while the answer is equal to liverpool display OBVIOUSLY NOT and get them to enter again when it is no longer liverpool display good anything but liverpool.

Iteration while loop
Create a variable to store the number 200 while the number is bigger than 0 display the number and then minus 1 from the variable.

String manipulation
Using the variable word = "Computer Science" how would you do the following:

Display the 2nd character:
Display the length of the stored data:
Display all in capital letters:
Display the last 3 characters:
With another variable called word2 = "is the best" how would you concatenate the two variables?

Programming Techniques

User input - write the lines of code:
Ask the user to enter their dream job:

Ask the user to enter their lucky number:

Ask the user how much money they have in their bank account.

Ask the user to enter their mobile number:

IF/ELSE Statements - write the lines of code:
Create a variable called target and assign the number 47 ask the user to enter a number, if the number matches the target display correct otherwise display incorrect.

IF/ELSE Statements - write the lines of code:
Ask the user to enter a number if the number entered MOD 2 equals 0 display even number otherwise display odd number

IF/ELIF/ELSE Statements - write the lines of code:
Ask the user to enter their mark in a test (100 max) if the mark is greater than 80 display DIST, if the mark is greater than 60 display MERIT if the mark is greater than 40 display PASS otherwise display failed.

Programming Techniques

1D Arrays
Datalist = [35,64,74,84,95,83,65]
Write the code for the following:

Display the 2nd element(64):
Change the 4th element to 48:
Remove the last element:
Add a new element:
Use a for loop to display each element on separate lines:

2D Arrays
Datalist2 =[["Bob",46,78],["Fred",79,63],["Bert",23,45]]
Write the code for the following:
Display all elements for the 3rd person:
Display the two numbers for the 2nd person:
Change the 1st persons second number to 87:
Use an if statement to check whether the freds first number is greater than 80, if it isn't change it to a number greater than 80.

Subroutine Procedure
Create a procedure which will display a sentence using the users name.
In the main program ask the user to enter their name
Call the procedure and pass the users name into the procedure.

Subroutine Function
In the main program ask the user enter the radius of a cylinder
In the main program ask the user to enter the height of a cylinder
Create a function which will carry out the calculation using the details entered by the user.
        Pi * height * radius
The function needs to return the answer to the main program.
Call the function making sure to pass the users information in.

Programming Techniques

File Handling

Write a program which does the follownng:

Inputs the title and year of a book from the user,

Creates a code using the 1st 3 letters from the title and the last 2 digits from the year.

Stores the book code to a txt file called bookcodes.txt

Combining techniques

Heath is researching how long, to the nearest minute, each student in his class spends playing computer games in one week (Monday to Friday). He is storing the data in a 2D array.

Fig. 2 shows part of the array, with 4 students.

Fig. 2

Students

Days of the week	0	1	2	3
0	60	30	45	0
1	180	60	0	60
2	200	30	0	20
3	60	10	15	15
4	100	35	30	45

For example, student 1, on Monday (day 0), played 30 minutes of computer games.

Heath has the day of the week stored as a number e.g. 0 = Monday, 1 = Tuesday.

Write a sub-program that takes the number as a parameter and returns the day of the week as a string.

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1	180	60	0	60
2	200	30	0	20
3	60	10	15	15
4	100	35	30	45

For example, student 1, on Monday (day 0), played 30 minutes of computer games.

Heath needs to work out the average number of minutes spent playing computer games each day for the class, which contains 30 students. Write an algorithm to output the average number of minutes the whole class spends playing computer games each day.

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Combining techniques

OCR Land is a theme park aimed at children and adults. Entrance tickets are sold online. An adult ticket to OCR Land costs £19.99, with a child ticket costing £8.99. A booking fee of £2.50 is added to all orders.

A function, `ticketprice()`, takes the number of adult tickets and the number of child tickets as parameters. It calculates and returns the total price to be paid.

(i) Use pseudocode to create an algorithm for the function `ticketprice()`.

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