# THE UNIVERSITY OF AUCKLAND

**SUMMER SEMESTER, 2020**
**Campus: City**

**COMPUTER SCIENCE**

**An Introduction to Practical Computing**

**(Time Allowed: TWO hours)**

**NOTE:**
You must answer **all** questions in this exam.
Calculators are NOT permitted.
Answer Section A (Multiple choice questions) on the Teleform answer sheet provided.
Answer Section B in the space provided in this booklet.
There is space at the back for answers that overflow the allotted space.

| | |
|---|---|
| **Surname** | |
| **Forename(s)** | |
| **Student ID** | Model Answers |
| **Login (UPI)** | |

| | Question | Mark | Out Of |
|---|---|---|---|
| 1 - 30 | Multiple Choice | | 30 |
| 31 | Programming using Python | | 10 |
| 32 | Spreadsheets | | 12 |
| 33 | Databases | | 13 |
| 34 | LaTeX | | 15 |
| 35 | HTML5/CSS | | 20 |
| TOTAL | | | 100 |

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# SECTION A : MULTIPLE CHOICE QUESTIONS

There is only **one** correct answer for each question. For each question, choose the **best** answer according to the information presented in lectures. Select your preferred answer on the Teleform answer sheet provided by shading in the appropriate box.

The following specifications are used to answer Question 1 and Question 2:

Intel Core i9-9900KF Processor 16M Cache up to 5.00 GHz
Gigabyte Z390 AORUS PRO Wi-Fi supports 1.73 Gbps
Corsair Dominator Platinum RGB 16GB (2x8GB) DDR4 2666MHz
Samsung 970 EVO Plus 1TB M.2 NVMe SSD
Seagate EXOS Enterprise 6TB 3.5" 256MB Sata3 HDD
Gigabyte Geforce RTX 2080 Ti Xtreme WaterForce RGB Fusion 2.0 11GB GDDR6 1770 MHz
Corsair HX Series 750W Fully Modular 80 Plus Platinum Power Supply
Noctua NH-D15 CPU Cooler with 2x NF-A15 140mm Fans

**Question 1**
[1 mark] What is the total capacity of the secondary storage?

(a) 6 TB
(b) 7 TB
(c) 27 GB
(d) 16 TB
(e) 16 GB

**Question 2**
[1 mark] What is the speed of the RAM?

(a) 2666 MHz
(b) 1.73 Gbps
(c) 970 EVO
(d) 5.00 GHz
(e) 1770 MHz

**Question 3**
[1 mark] What is the binary representation of the decimal number 160?

(a) 0101 0000
(b) 1010 0101
(c) 1010 0000
(d) 0000 0101
(e) 0000 1010

**Question 4**
[1 mark] What is the decimal representation of the following 101000 + 10110?

(a) 33
(b) 32
(c) 31
(d) 63
(e) 62

**Question 5**
[1 mark] Which one of the following statements is FALSE?

(a) Some file formats are open standards while others are proprietary standards.
(b) The owner of a proprietary standard may prevent it from being used in new software.
(c) Shareware is software that is free to distribute and whose source code is public.
(d) Open source software is available for free.
(e) System software is a category that may include open source software.

**Question 6**
[1 mark] Which one of the following statements is FALSE?

(a) A graphically based interface is typically easier to use than a text-based interface.
(b) Many GUIs can be controlled purely with text input.
(c) A CLI allows a user to combine commands to perform complex tasks.
(d) A file extension is used by some operating system to determine which software to execute when the file is opened.
(e) Software is not protected by copyright if it can be downloaded for free (e.g., Acrobat Reader).

**Question 7**
[1 mark] Which one of the following statements about networking is TRUE?

(a) NSFNET began with four nodes in 1969, and later grew into what we call the Internet.
(b) ARPANET is still active today and continues to grow, although the growth rate has slowed.
(c) The World Wide Web was created as a way for Physics researchers to share information.
(d) The Domain Name System was created before Transmission Control Protocol was developed.
(e) New Zealand was connected to ARPANET in 1983.

**Question 8**
[1 mark] Which protocol would most likely be used when sending short text messages in an online chat system?

(a) FTP
(b) IMAP
(c) UDP
(d) TCP/IP
(e) SMTP

**Question 9**
[1 mark] If you sent a message with the fields as shown in the image below, which one of the following statements is TRUE?

(a) X does not know that U was sent the message.
(b) U does not know that V was sent the message.
(c) W does not know that X was sent the message.
(d) V does not know that Y was sent the message.
(e) Y does not know that V was sent the message.

**Question 10**
[1 mark] Which one of the following statements is TRUE?

(a) PGP is a protocol that is used to download email from a server to a client and delete the server copy.
(b) POP3 is a protocol that is used to send email to the server from a client.
(c) SPAM is a protocol used to send photos through email from a client to a server.
(d) IMAP is a transfer protocol that allows email to remain on the server while reading on a client.
(e) Inbox Zero is an application that uses an encrypted protocol to ensure user anonymity.

**Question 11**
[1 mark] Which one of the following statements is TRUE?

(a) Pinterest is an example of a vlog.
(b) Encyclopedia Britannica purchased Wikipedia in 2008 to maintain an online presence.
(c) Wikis were originally developed in CERN to share information between researchers.
(d) Wikipedia was created by Ward Cunningham in 1995.
(e) Twitter is a microblogging platform.

**Question 12**
[1 mark] Which one of the following is the Wiki markup used to indicate an item in an ordered list?

(a) `+item`
(b) `=item`
(c) `#item`
(d) `*item`
(e) `$item`

**Question 13**
[1 mark] Which one of the following statements is FALSE?

(a) Hypertext links in the WWW are designed to be unidirectional, which means that the destination of a link may be moved or deleted without the source being notified, resulting in broken links.
(b) A filter bubble results when search engine algorithms personalize search results and display information that conforms and reinforces existing beliefs.
(c) The Google search engine algorithm is secret, so the general public does not know how the results of a search are being ranked when presented to a user.
(d) Search engines collect personal data and use that data to target users with customized advertising.
(e) Using private browser mode prevents search engines such as Google from tracking search history when you are logged into Google as a user.

**Question 14**
[1 mark] What is the purpose of a domain name server?

(a) To serve web pages that belong to the same web site domain.
(b) To intercept any requests and use a black list of domains and names to block access to unacceptable material.
(c) To ensure the anonymity of Internet users using secure protocols to pass information between domains.
(d) To convert a human readable domain name into an IP address.
(e) To improve the speed of web page delivery by storing a local copy of all named pages.

**Question 15**
[1 mark] Which of the following statements is FALSE?

(a) Cambridge Analytica provided a service to use microtargeting for political advertising.
(b) Facebook manipulated user newsfeeds to determine if the emotional state of a user could be manipulated.
(c) Emotional contagion was a malware virus spread through Facebook apps.
(d) Cambridge Analytica collected data from Facebook users without their knowledge.
(e) User modelling by social media companies is so effective that people think their conversations are being recorded.

**Question 16**
[1 mark] Which of the following statements is TRUE?

(a) Netsafe is a government approved agency that can be approached to mediate online bullying.
(b) The Harmful Digital Communications Act 2015 was created to provide legal redress for spam emails.
(c) Peer to Peer (P2P) file sharing is illegal and anyone caught sharing files using P2P could be fined up to $15,000.
(d) An Internet Service Provider that identifies a copyright infringement must report the breach to an appropriate government agency within 48 hours.
(e) The Office of Film and Literature Classification maintains a black list of Internet sites that contain offensive material which can be used by ISPs to censor information in NZ.

**Question 17**
[1 mark] Your printer prints 400 dots per cm. Your printer paper has size 10 cm x 10 cm. Assuming that your printer can print on this paper, will a square image taken with a 16-megapixel digital camera fit on a single printed page?

(a) No, only 1/25 of the image will fit on a single page.
(b) No, only 1/2 of the image will fit on a single page.
(c) Yes, it fits perfectly on a single page.
(d) Yes, but it only takes 1/2 of the page.
(e) None of the above.

**Question 18**
[1 mark] You have four 16-colour images taken by an 8-megapixel camera and 80 black and white pictures taken with a 1-megapixel camera. How much memory in total do you need to store these images on your computer?

(a) 100 MB of hard disk space.
(b) 10 MB of RAM.
(c) 10 MB of hard disk space.
(d) 26 MB of hard disk space.
(e) 16 MB of RAM.

**Question 19**
[1 mark] Who developed a computer that was used to break encrypted German radio messages during WWII?

(a) Paul Allen.
(b) Alan Turing.
(c) Donald Knuth.
(d) Charles Babbage.
(e) Dan Bricklin.

**Question 20**
[1 mark] Which of the following statements is FALSE?

(a) Apple II was the first successful personal computer.
(b) Mainframes were very expensive, took up a lot of room and were difficult to operate.
(c) The invention of vacuum tubes, which replaced transistors, made computers smaller, faster and more reliable.
(d) The first microprocessor was the Intel 4004.
(e) Charles Babbage designed the Analytical Engine.

**Question 21**
[1 mark] Which of the following statements about ASCII is FALSE?

(a) ASCII only encodes letters from the English alphabet (both uppercase and lowercase).
(b) Uppercase characters have numerically lower ASCII codes than lowercase characters.
(c) ASCII is the acronym for “American Standard Code for Information Interchange”.
(d) The ASCII code for “Exam” is 69 120 97 109.
(e) UTF-8 is another character encoding scheme.

**Question 22**
[1 mark] Which of the following is WYSIWYG?

(a) LaTeX code used to typeset a MATHS 120 assignment.
(b) Wiki markup used to create content in the Stage One Wiki.
(c) A Python file containing code for a program.
(d) A Microsoft Word document for a COMPSCI 111 lab report.
(e) An HTML file encoding a webpage.

**Question 23**
[1 mark] Which of the following statements are TRUE?

**I.** Studies have shown that using digital devices during class for non-class purposes, causes students to pay less attention to the content taught.
**II.** Instant gratification is characterized by a grandiose sense of self-importance.
**III.** There is a lot of evidence documenting a relationship between depression and technology.
**IV.** Studies have shown that increased interaction with technology has negatively affected face-to-face communication skills.

(a) I and II.
(b) II and III.
(c) II, III and IV.
(d) I, II, III and IV.
(e) I, III and IV.

**Question 24**
[1 mark] Which of the following statements are FALSE?

**I.** CVS is caused by overly bright computer screens.
**II.** Listening to media at moderate volumes does not cause hearing loss.
**III.** Stress can be a factor in the development of OOS.
**IV.** Taking regular breaks is advisable when interacting with technology.

(a) II, III and IV.
(b) I, II and IV.
(c) I and II.
(d) III and IV.
(e) I, II and III.

**Question 25**
[1 mark] Which of the following are NOT considered intelligent activity?

**I.** Solving a mathematical problem.
**II.** Diagnosing a fault with your computer.
**III.** Modulating your heart rate based on your physical activity.
**IV.** Sneezing when inhaling an airborne irritant.

(a) II, III and IV.
(b) I, II and III.
(c) I and II.
(d) III and IV.
(e) I, II, and IV.

**Question 26**
[1 mark] Recall the following problem scenario discussed in class: a farmer needs to cross a river from the left bank to the right bank by boat. He wants to take with him his dog, his goose and a sack of corn. The boat is small and can only hold one item along with the farmer. The dog can't be left alone with the goose as it will eat the goose. The goose can't be left alone with the corn as it will eat the corn. We can represent the dog as **d**, the goose as **g** and the corn as **c**. We can perform two operations: We can take an item to the right bank →**( )** or the left bank ←**( )**, where the item being transported is specified between the parentheses. Using the above symbolic representation of this problem, which of the following options is a valid solution to the problem?

(a) →(d), →(c), ←(d), →(g), →(d)
(b) →(g), →(d), ←(g), →(c), →(g)
(c) →(g), →(c), →(d)
(d) →(d), →(c), →(g)
(e) →(c), →(d), →(g)

**Question 27**
[1 mark] Which of the following statements is TRUE?

(a) All cards in a collectable card game have the same value.
(b) Board games originated from the desire to make games appear more appealing.
(c) Divination games are examples of perfect information games.
(d) Pinball is primarily a game of chance.
(e) Character development and narrative structure are features of roleplaying games.

**Question 28**
[1 mark] Which of the following statements are TRUE?
**I.** Many animal species engage in play.
**II.** Play may occur at any stage of life.
**III.** Interspecies play never happens.
**IV.** Play can be used by animals to determine social rank.

(a) II and III.
(b) I and III.
(c) III and IV.
(d) I, II, and IV.
(e) I, II and III.

**Question 29**
[1 mark] Look at the following events in the history of digital games:

**I.** William Higinbotham develops "Tennis for Two".
**II.** Atari's first home console is released.
**III.** The Magnavox Odyssey home console is released.
**IV.** "Spacewar!" is released.
**V.** Alan Turing develops an algorithm to play chess.

Which of the following options lists these events in chronological order from oldest to most recent?

(a) I, II, III, IV and V.
(b) III, IV, V, I and II.
(c) V, I, IV, III and II.
(d) I, IV, V, III and II.
(e) V, IV, I, II and III.

**Question 30**
[1 mark] Which of the following statements is TRUE?

(a) Role Playing games always have a fantasy setting.
(b) Combat in strategy games can be real-time or turn-based.
(c) Platform games focus on navigation through 3D environments only.
(d) Fighting games always emulate real-world sports.
(e) Shoot 'em ups are commonly referred to as light gun shooters.

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QUESTION/ANSWER BOOKLET FOLLOWS

## SECTION B

Answer all questions in this section in the space provided. If you run out of space, please use the Overflow Sheet and indicate in the allotted space that you have used the Overflow Sheet.

### 31. Programming Using Python (10 marks)

(a) Write a Python program that prompts the user to enter an integer value N as in the examples below. If the number entered is greater than zero the program will calculate and print the first N elements of a Fibonacci sequence. Otherwise, it will terminate with the message "`The number should be a positive integer`".

A Fibonacci sequence is the integer sequence of 0, 1, 1, 2, 3, 5, 8, 13, … where the first two terms are 0 and 1. All other terms are obtained by adding the preceding two terms.

Here are two examples of the program running with different values entered by the user. User input is indicated in the examples with bold and italicized font.

***Example 1:***

```
Enter the number of elements: -2
The number should be a positive integer
```

***Example 2:***

```
Enter the number of elements: 5
The Fibonacci sequence of length 5 is:
0
1
1
2
3
```

```
n = int(input("Enter the number of elements: "))
if n > 0:
    print("The Fibonacci sequence of length", n, "is:")
    element = 0
    previous_1 = 0
    previous_2 = 0
    term = 0
    while element < n:
        if element == 0:
            term = 0
        elif element == 1:
            term = 1
        print(term)
        previous_2 = previous_1
        previous_1 = term
        term = previous_1 + previous_2
        element = element + 1
else:
    print("The number should be a positive integer.")
```

5 marks)

(b) On the following page, draw the output produced by the turtle in the following Python program. Assume that the turtle begins in the middle of the window facing right and that the window is approximately 400 steps wide. As you draw, use arrowed lines to show the direction in which the cursor moves after each step on the plotting window.

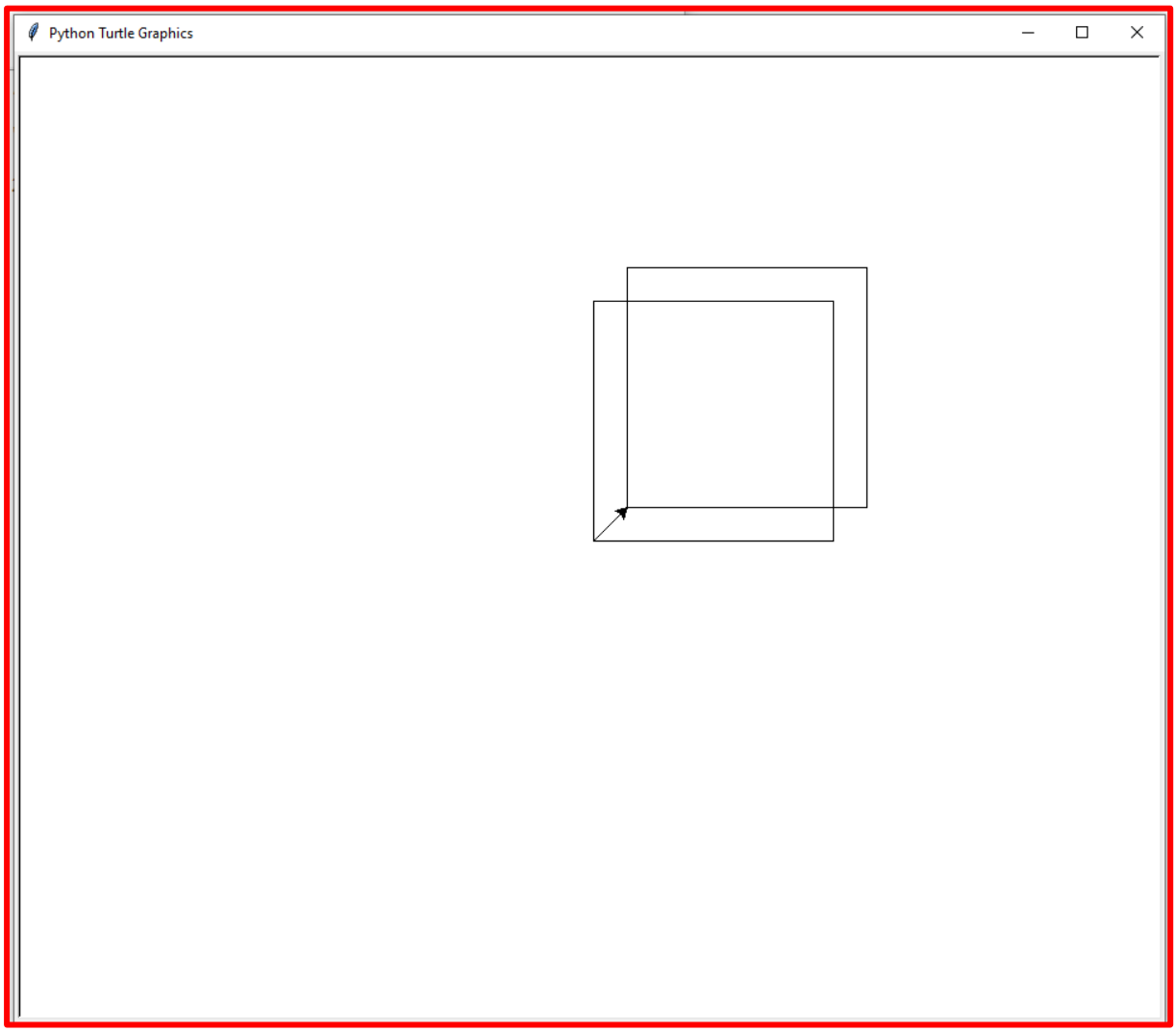
```
import turtle
step_long = 100
step_short = 20
angle = 45
count_in = 1

while count_in <= 4:
    turtle.forward(step_long)
    if count_in == 4:
        turtle.left(3 * angle)
    else:
        turtle.left(2 * angle)
    count_in = count_in + 1

turtle.forward(step_short)
turtle.left(angle)
count_out = 1

while count_out <= 4:
    turtle.forward(step_long)
    if count_out == 4:
        turtle.right(3 * angle)
    else:
        turtle.right(2 * angle)
    count_out = count_out + 1
```

(5 marks)


Python Turtle Graphics

## 32. Spreadsheets (12 marks)

The following spreadsheet displays information about ticket sales for the 2020 New Zealand International Film Festival. Cells **A12** to **H15** contain information on ticket sales transactions for the festival.

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | 2020 New Zealand International Film Festival | | | | | | | |
| 2 | | | | | | | | |
| 3 | Discounts | | | | | | | |
| 4 | Tickets Purchased | Discount (%) | | | | | | |
| 5 | 0 | 0 | | Category | Student | Adult | Senior | |
| 6 | 5 | 10 | | Ticket Price | $14.00 | $17.00 | $12.00 | |
| 7 | 10 | 15 | | | | | | |
| 8 | 15 | 20 | | | | | | |
| 9 | | | | | | | | |
| 10 | Sales Transactions | | | | | | | |
| 11 | Code | Student | Adult | Senior | Subtotal | Discount | Total | Free Gift |
| 12 | 000 | 2 | 1 | 0 | $45.00 | $0.00 | $45.00 | No |
| 13 | 001 | 1 | 2 | 2 | $72.00 | $7.20 | $64.80 | Yes |
| 14 | 010 | 10 | 0 | 2 | $164.00 | $24.60 | $139.40 | Yes |
| 15 | 011 | 4 | 5 | 5 | $201.00 | $30.15 | $170.85 | Yes |

(a) What is the best formula to use in Cell **G12** to display the total for the transaction with Code 000?

**Note:** Your formula must be able to be filled down from **G12** to **G15** correctly.

```
= E12 - F12
```

(1 mark)

(b) A free gift is given if the total for a transaction is $50 or more. What is the best formula to use in cell **H12** so that "Yes" is displayed if a free gift is given and "No" displayed otherwise? Your answer must use an **IF** function which is described below:

```
=IF(logical test, value if true, value if false)
```

**Note:** Your formula must be able to be filled down from **H12** to **H15** correctly.

```
= IF(G12 >= 50, "Yes", "No")
```

(3 marks)

(c) What is the best formula to use in Cell **F12** to display the discount to be applied to the subtotal of the transaction with Code 000? Discounts are given based on the number of tickets sold in a transaction. The table containing information on the number of tickets sold and the associated percentage discount is located in Cells **A5 : B8**. Your answer must use a **VLOOKUP** function which is described below:

```
=VLOOKUP(lookup value, table array, column index number,
         range lookup)
```

**Note:** Your formula must be able to be filled down from **F12** to **F15** correctly.

```
= E12 * VLOOKUP(B12 + C12 + D12,
        $A$5:SB$8, 2, TRUE) / 100)
```

(4 marks)

(d) What is the best formula to use in Cell **E12** to calculate the subtotal for the transaction with Code 000? There are three ticket categories (Student, Adult and Senior), and each category has an associated ticket price. The table containing information on the ticket prices for each ticket category is located in Cells **E5 : G6**. Your answer must use the HLOOKUP function which is described below:

```
=HLOOKUP(lookup value, table array, row index number,
         range lookup)
```

**Note:** Your formula must be able to be filled down from **E12** to **E15** correctly.

```
= HLOOKUP(B11, $E$5:$G$6, 2, False)
        * B12
+ HLOOKUP(C11, $E$5:$G$6, 2, False)
        * C12
+ HLOOKUP(D11, $E$5:$G$6, 2, False)
        * D12
```

(4 marks)

## 33. Databases (13 marks)

You run a bookstore, and you keep track of the books you sell in your store by maintaining a database of three tables (Author, Book, and Link_Author_Book). More specifically, you have records of all the books you currently have in the store. You also keep records of every author whose books have been sold in your store.

Here are the contents of each of the three tables in datasheet view:

**Author**

| ID | Author | Country of Origin | Year of Birth | Active |
|---|---|---|---|---|
| 1 | Agatha Christie | England | 1890 | No |
| 2 | Anne Frank | Germany | 1929 | No |
| 3 | Bentley Little | USA | 1960 | Yes |
| 4 | Bram Stoker | Ireland | 1847 | No |
| 5 | Caleb Carr | USA | 1955 | Yes |

**Book**

| ISBN | Title | Book Series | Rating | Number of Pages | Year Publish | Genre |
|---|---|---|---|---|---|---|
| 9780062473356 | Dragon Teeth | | 3.74 | 304 | 2017 | Adventure |
| 9780002239226 | Problem at Pollensa Bay | Hercule Poirot | 3.56 | 232 | 1985 | Crime |
| 9780002242042 | Second Skin | Nicholas Linnear | 3.91 | 454 | 1995 | Thriller |
| 9780002310017 | At Bertram's Hotel | Miss Marple | 3.69 | 223 | 1965 | Crime |
| 9780002314572 | Lord Edgware Dies | Hercule Poirot | 3.87 | 260 | 1933 | Crime |
| 9780002317856 | Sleeping Murder | Miss Marple | 3.9 | 242 | 1976 | Crime |
| 9780006498520 | Hide and Seek | | 4.09 | 368 | 1995 | Crime |

**Link_Author_Book**

| Author ID | ISBN |
|---|---|
| 1 | 9780002239226 |
| 1 | 9780002310017 |
| 1 | 9780002314572 |
| 1 | 9780002317856 |
| 1 | 9780007111459 |

(a) State the **primary** key(s) and **foreign** key(s), if any, of the **Book** table.

Primary Key(s): **ISBN**

Foreign Key(s): **There are no foreign keys**

(1 mark)

(b) State the **primary** key(s) and **foreign** key(s), if any, of the **Link_Author_Book** table.

Primary Key(s): **Author ID, ISBN**

Foreign Key(s): **Author ID and ISBN**

(2 marks)

(c) Show the output of the following QBE query:

| Field: | ID | Author | ISBN | Year of Birth |
|---|---|---|---|---|
| Table: | Author | Author | Book | Author |
| Total: | Group By | Group By | Count | Group By |
| Sort: | | | | |
| Show: | ☑ | ☑ | ☑ | ☐ |
| Criteria: | | | | <1930 |
| or: | | | | |

| ID | Author | Count of ISBN |
|---|---|---|
| 1 | Agatha Christie | 4 |
| 2 | Anne Frank | 0 |
| 4 | Bram Stoker | 0 |

(4 marks)

(d) Write an SQL query to display the **Title, Number of Pages, Year Published** and **Rating** fields of all **Crime** novels with at least **200** pages and **Rating** of at least **3.5** published after **1900**. The resulting table should be displayed in ascending order of **Number of Pages**, and then descending order of **Year Published.**

The **first three rows** of the output obtained by running the query is shown below.

| Title | Number of Pages | Year Publish | Rating |
|---|---|---|---|
| At Bertram's Hotel | 223 | 1965 | 3.69 |
| Problem at Pollensa Bay | 232 | 1985 | 3.56 |
| Sleeping Murder | 242 | 1976 | 3.9 |

```
SELECT Title, [Number of Pages],
              [Year Published], Rating

FROM Book

WHERE Genre = "Crime"
  AND [Number of Pages] >= 200
  AND Rating >= 3.5
  AND [Year Published] > 1900

ORDER BY [Number of Pages] ASC,
         [Year Published] DESC;
```

(6 marks)

## 34. LaTeX (15 marks)

On the following pages, complete the LaTeX code that will produce the output below:

# MNRAS template – title goes here

Name1 Surname1, Name2 Surname2, . . .

*Day Month Year*

## 1 Introduction

This is a *simple template* for authors to write new MNRAS papers. See `mnras_sample.tex` for a more complex example, and `mnras_guide.tex` for a full user guide.[1]

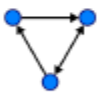
## 2 Methods

Normally the next section describes the techniques the authors used. It is frequently split into subsections, such as Section 2.2 below.

### 2.1 Figures and tables

Figures and tables should be placed at logical positions in the text.

- Figures, like the one below, are referred to as e.g. Fig. 1.
- Tables, if used, are referred to as e.g. Table 1.



### 2.2 Maths

Simple mathematics can be inserted into the flow of the text e.g. $2+\sqrt{9} = 5$ or $v = 220\,\mathrm{km\,s^{-1}}$ or 10 \$/min, but more complicated expressions should be entered as a *numbered equation*:

$$x = \frac{-b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}. \qquad (1)$$

Refer back to them as e.g. equation (1).

[1]This template can be downloaded from `https://www.mnras.com/templates/latex`

The image is stored in a file called **directed.png** and is in the same folder as the LaTeX code. When inserted into the document, the image should be **centred** and **2 cm wide**.

The following LaTeX commands have been included as a reference. You will not need to use all of these commands.

| *Normal commands* | *Environments* | *Math mode commands* |
|---|---|---|
| \usepackage{graphicx} | itemize | $ |
| \section{} | enumerate | \sqrt{} |
| \subsection{} | verbatim | \frac{}{} |
| \title{} | flushright | \tan |
| \author{} | center | \sin |
| \date{} | quote | \sum_{}^{} |
| \maketitle | displaymath | \pi |
| \ldots | equation | \pm |
| \item | quotation | \theta |
| \textbf{} | | ^ |
| \textit{} | | \$ |
| \texttt{} | | _ |
| \emph{} | | \left( |
| \includegraphics{} | | \right) |
| \footnote{} | | |

```
\documentclass[a4paper]{article}
\usepackage{graphicx}
\begin{document}

\title{\textbf{MNRAS template - title goes here}}
\author{Name1 Surname1, Name2 Surname2, \dots}
\date{\emph{Day Month Year}}
\maketitle
\section{Introduction}
This is a \emph{simple template} for authors to
write new MNRASpapers. See
\textbf{\texttt{mnras\_sample.tex}} for a more
complex example and
\textbf{\texttt{mnras\_guide.tex}} for a full user
guide.\footnote{This template can be downloaded
from
\texttt{\textbf{https://www.mnras.com/templates/lat
ex}}}
\section{Methods}
Normally the next section describes the techniques
the authors used. It is frequently split into
subsections, such as Section 2.2 below.
\subsection{Figures and tables}
Figures and tables should be placed in logical
positions in the text. Don't worry about the exact
```

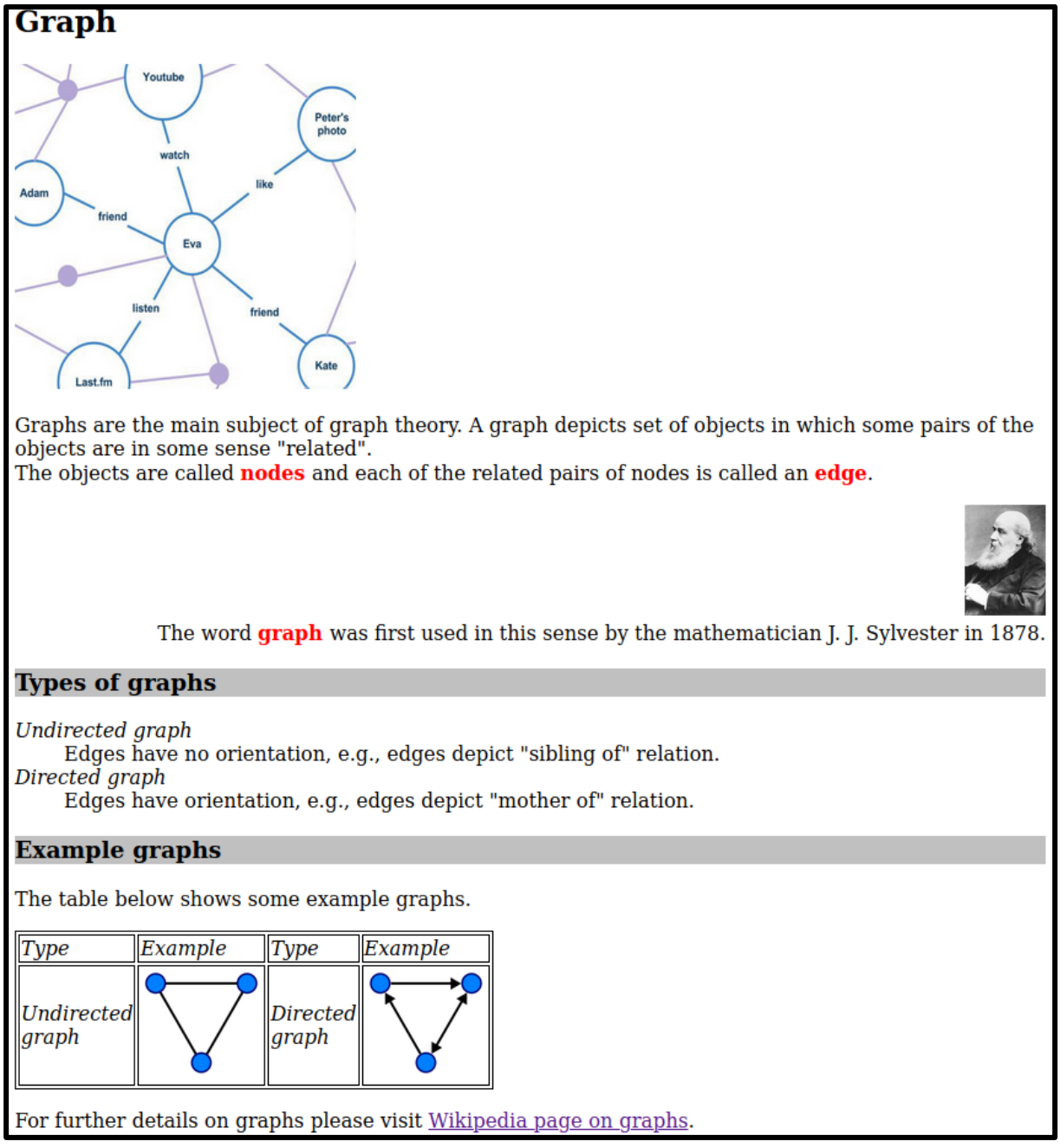
```
layout.
\begin{itemize}
\item Tables are referred to as e.g. Table 1.
\item Figures are referred to as e.g. Fig. 1.
\end{itemize}
\begin{center}
\includegraphics[width=2cm]{directed.jpg}
\end{center}
\begin{center}
Figure 1: This is an example figure.
\end{center}
\subsection{Maths}
Simple mathematics can be inserted into the flow of
the text e.g. $2 + \sqrt{9} = 5$ or $v = 220$
kms$^{-1}$, but more complicated expressions should
be entered as a numbered equation:
\begin{equation}
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.
\end{equation}
Refer back to them e.g. equation(1).
```

```
\end{document}
```

(15 marks)

## 35. HTML5 and CSS (20 marks)

The following screenshot shows the body of a web page created using HTML5 and CSS:




Complete the HTML5 code on the following pages so that it produces the web page above.

You **must** use the styles defined in the internal style sheet in the head section on the next page, and **must not** define any new styles unless you are specifically told to do so.

**Note:**

(1) The URL for the Wikipedia page on graphs is:
`"http://en.wikipedia.org/wiki/Graph_discrete_mathematics".`

(2) All images are stored in the same folder as the HTML file. The image of the mathematician is stored in a file called `"JJS.jpg"`, the first graph image is stored in

"social_graph.png", the directed graph image is stored in "directed.jpg", and the undirected graph image is stored in "undirected.jpg".

**(3)** There are three sections (the "Graph" section, "Types of graphs" section and the "Examples" section) and there is no main heading.

```
1  <!DOCTYPE html>
2  <html lang="en">
3  <head>
4  <meta charset="UTF-8">
5  <title>HTML/CSS Exam Question</title>
6  <style>
7  h2 {color:black; background-color: white;}
8  h3 {color:black; background-color: silver;}
9  table, tr, td {border: 1px solid black;}
10 .emphasis {font-weight:bold; color:red;}
11 #right {text-align:right;}
12 dt,td {font-style: italic;}
13 </style>
14 </head>
```

```
<body>
```

**<!-- "Graph" Section -->**

```
<section>
<h2>Graph</h2>
<img src="social_graph.png" alt="Graph of social
objects and their relations">
<p>
Graphs are the main subject of graph theory. A graph
depicts set of objects in which some pairs of the
objects are in some sense "related".<br>
The objects are called <span class="emphasis"> nodes
</span> and each of the related pairs of nodes is
called an <span class="emphasis"> edge</span>.
</p>
<div class="right">
<img src="JJS.jpg"  width="66" height="90",
alt="James Joseph Sylvester">
<p>
The word <span class="emphasis"> graph </span> was
first used in this sense by the mathematician J. J.
Sylvester in 1878.
</p>
</div>
</section>
```

(6 marks)

```
<!--  "Types of graphs" Section -->
<section>
<h3>Types of graphs</h3>
<dl>
<dt>Undirected graph </dt>
<dd>Edges have no orientation, e.g., edges depict
"sibling of" relation.</dd>
<dt>Directed graph</dt>
<dd> Edges have orientation, e.g., edges depict
"mother of" relation.</dd>
</dl>
</section>
```

(4 marks)

```
<!-- "Example graphs" Section -->
<section>
<h3>Example graphs</h3>
<p>
The table below shows some example graphs.
</p>
<table>
<tr>
<td>Type</td>   <td>Example</td>
<td>Type</td>   <td>Example</td>
</tr>
<tr>
<td>Undirected <br> graph</td>
<td> <img src="undirected.png alt="Undirected graph
"> </td>
<td>Directed <br> graph </td>
<td><img src="directed.png" alt="Directed
Graph"></td>
</tr>
</table>
<p>
For further details on graphs please visit
 <a
href="https://en.wikipedia.org/wiki/Graph_(discrete_m
athematics)"> Wikipedia page on graphs</a>.
</p>
</section>
```

(6 marks)

The person who designed the web page forgot to put a footnote (at the bottom of the web page) with the following text "Copyright UoA 2020". The footnote has a special format: the text should be in italic and centred. You need to add the footnote and also update the stylesheet with a new style so that the footnote is italic and centred.

```
<!-- Footnote paragraph -->
```

```
<p id = "footnote">
Copyright UOA 2020
</p>
```

(2 marks)

```
</body>
</html>
```

Now modify the given internal stylesheet to accommodate for the footnote formatting. You do not need to copy the code from the original stylesheet - just write the code that you will add to the stylesheet, and specify where exactly the new code line(s) will be inserted in the internal style code. Use the line numbers provided in the original stylesheet to be more specific.

```
<!-- Style update for footnote-->
```

```
.id footnote{font-style: italic; text-align: center;}

(Insert before Line #13)
```

(2 marks)