THE UNIVERSITY OF AUCKLAND

SUMMER SEMESTER, 2014
Campus: City

COMPUTER SCIENCE

An Introduction to Practical Computing

(Time Allowed: TWO HOURS)

NOTE:
You must answer **all** questions in this exam.
No calculators are 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	*Sample*
Forenames	*Solutions*
Student ID	
Login (UPI)	

	Question	Mark	Out Of
1 - 25	Multiple Choice		50
26	Programming using Python		10
27	LaTeX		10
28	XHTML and CSS		10
29	Spreadsheets		10
30	Databases		10
	TOTAL		100

SECTION A

MULTIPLE CHOICE QUESTIONS

Each question in this section is worth **2 marks**. 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.

Question 1
[2 marks] What is the decimal representation of the number represented in binary as 10000?

(a) 32
(b) **16**
(c) 10,000
(d) None of the above.

Question 2
[2 marks] How much difference is there between 1MB and 1MiB?

(a) 1,024 bytes.
(b) 24 bytes.
(c) 6,072 bytes.
(d) **48,576 bytes.**

Question 3
[2 marks] A cache is …

(a) a method of storage that improves reliability through redundancy.
(b) software that prevents unauthorized access to a network.
(c) **a copy of data that can be accessed quickly.**
(d) a tool to intercept illegitimate requests.

Question 4
[2 marks] Which one of the following lists includes ONLY memory technologies?

(a) DRAM, flash drive, CLI, ROM.
(b) **RAM, magnetic tape, flash drive, hard disk.**
(c) RAM, EPROM, CPU, ROM.
(d) SRAM, magnetic tape, hard disk, USB.

Question 5

[2 marks] Sarah wrote a program and showed it to some friends. She later discovered that one of these people, Edward, had written a program that accomplishes the same thing her program does. Which one of the following statements is TRUE?

   (a) **Edward copied the general approach but not the actual text, so copyright law does not apply.**
   (b) Copyright does not apply to software, so Edward can sell his program legally.
   (c) Copyright law prevents Edward from copying Sarah's idea, so his program is illegal.
   (d) Copyright law prevents people copying published works, but the software was not published so it doesn't apply in this case.

Question 6

[2 marks] Which one of the following statements about file formats is FALSE?

   (a) Changing the file extension does not change content in the file.
   (b) Some file formats are open standards and others are proprietary standards.
   (c) In a Windows OS, a file extension determines the application that is used to open the file.
   (d) **Changing the file extension will change the way information in the file is encoded.**

Question 7

[2 marks] Which one of the following statements about protocols is FALSE?

   (a) There are many different protocols used on the Internet.
   (b) **A file format is an example of a protocol used on the Internet.**
   (c) TCP is an example of a protocol used on the Internet.
   (d) A network protocol includes a set of rules and procedures for initiating, maintaining and terminating communication.

Question 8

[2 marks] What does a DNS server do?

   (a) Acts as a firewall to prevent unauthorized access to a private network.
   (b) Converts IP addresses into domain names.
   (c) **Converts domain names into IP addresses.**
   (d) Determines whether a web page exists or not.

Question 9
[2 marks] Which one of the following statements about spamming is TRUE?

    (a) **Spamming is posting or e-mailing unsolicited advertising messages to a wide audience.**
    (b) Spamming is sending lines of nonsensical garbage in a chat conversation.
    (c) Spamming is posting a message that contains graphic descriptions of something offensive.
    (d) Spamming is spilling the juice of meat byproducts onto your keyboard.

Question 10
[2 marks] Which one of the following statements is FALSE?

    (a) A forum moderator is able to edit and delete messages posted to the forum.
    (b) IMAP is a protocol used to receive email.
    (c) Any type of file can be sent as an email attachment, including viruses.
    (d) **POP3 is a protocol used to send and receive email.**

Question 11
[2 marks] Which one of the following statements is TRUE?

    (a) You can trust the material on a blog because the community is self-moderating.
    (b) **A blogger is a person who posts entries to a blog.**
    (c) Wikis are normally moderated by an administrator.
    (d) A wiki is a web site containing posts in reverse chronological order.

Question 12
[2 marks] Which one of the following statements is FALSE?

    (a) **You should never edit information that someone else has written on a wiki.**
    (b) A blog is a website containing opinions written by an individual.
    (c) The first wiki was developed by Ward Cunningham.
    (d) Blogs are an enabling technology for grassroots movements.

Question 13
[2 marks] Which one of the following statements about the WWW is FALSE?

    (a) The WWW is a hypermedia system.
    (b) The protocol used to transfer web pages is http.
    (c) **The WWW is another name for the Internet.**
    (d) The WWW was created by Tim Berners-Lee.

Question 14

[2 marks] Where does the term Modem come from?

    (a) MODern EMulator.
    (b) MOdulation DEMon.
    (c) MOdular Digital EMulator.
    (d) **MOdulator/DEModulator.**

Question 15

[2 marks] Which one of the following statements about EndNote is FALSE?

    (a) It maintains a database of references.
    (b) **It can alert you to inappropriate references.**
    (c) References can be imported from online libraries.
    (d) It assists in maintaining consistent referencing.

Question 16

[2 marks] Which one of the following statements is TRUE?

    (a) **The Portable Document Format (PDF) is derived from PostScript, used to control laser printers.**
    (b) Text editors all use a command line interface, while Microsoft Word uses a graphical user interface.
    (c) WYSIWYG is a computer language used by word processors.
    (d) ASCII is a standard that describes the encoding for 65536 different characters.

Question 17

[2 marks] How much memory is required to represent a bitmap image that uses 256 colours and is 20 pixels wide and 25 pixels high?

    (a) 1000 bytes.
    (b) 128,000 bits.
    (c) **500 bytes.**
    (d) 4,000 bytes.

Question 18

[2 marks] Which one of the following statements about image formats is FALSE?

    (a) JPEG is a lossy method that is good for photographs, but not as good for diagrams.
    (b) Images stored using SVG can be enlarged without any visible loss in quality.
    (c) PNG can be used for photographs but is best for graphics and diagrams.
    (d) **A GIF image has a maximum of 16 different colours.**

Question 19

[2 marks] Which one of the following statements about PowerPoint presentation design is TRUE?

(a) Use lots of animation as it always makes your presentation more interesting.

(b) It is good to use a small font size as it allows you to add more text to the slides.

(c) **It is best to use a Sans Serif typeface for your slides.**

(d) Using Flash animations is recommended, since it is fast and supported by all browsers.

Question 20

[2 marks] Which one of the following companies existed before the rise of modern day personal computers?

(a) Microsoft.

(b) **IBM.**

(c) Apple.

(d) Google.

Question 21

[2 marks] Which company built the first microprocessor?

(a) Microsoft.

(b) Apple.

(c) IBM.

(d) **Intel.**

Question 22

[2 marks] Which one of the following statements about artificial intelligence is TRUE?

(a) **The ability to recognize sentences in a normal conversation sets human intelligence apart from the intelligence of animals like dogs.**

(b) The field of artificial intelligence is only a few years away from producing completely autonomous AI with human-like thought processes and reasoning.

(c) Only embodied agents that exist in a physical environment can exhibit intelligence.

(d) The 'AI winter' is a term which describes a period of time when, within a few months, several major discoveries in different areas of AI research were made.

Question 23

[2 marks] For which one of the following games does there currently NOT exist an AI that beats the best human players?

(a) Chess.

(b) Checkers.

(c) **Go.**

(d) Jeopardy.

Question 24

[2 marks] Which one of the following methods can NOT be used to protect children from unsuitable material on the Internet?

    (a) **Using VPN when surfing on the Internet.**

    (b) Maintaining a white list of addresses.

    (c) Supervising children while they are active online.

    (d) Maintaining a black list of addresses.

Question 25

[2 marks] Which one of the following statements relating to social issues is FALSE?

    (a) Prior to the Copyright Amendment Act 2008, it was illegal to shift music from a CD to an MP3 player, even if you owned the CD.

    (b) Peer to Peer networks allow information stored on a home machine to be shared with other users.

    (c) A VPN can be used to hide the user's IP address when using the Internet.

    (d) **If information is legal in the country where it is hosted, that information can be legally accessed from any other country.**

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SECTION B

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

26. Programming Using Python (10 marks)

(a) Show the output produced by the following Python program:

```
counter = 3

while counter > 0:
    if counter % 2 == 0:
        print(counter * (counter - 1))
    else:
        print(counter * (counter + 1))
    counter = counter - 1
```

```
12
2
2
```

(3 marks)

(b) Show the output produced by the following Python program:

```
counter = 0

while counter < 6:
    result = ""
    innerCounter = counter
    while innerCounter > 0:
        result = result + "@"
        innerCounter = innerCounter - 1
    print(result);
    counter = counter + 1
```

```
@
@@
@@@
@@@@
@@@@@
```

(3 marks)

(c) Write a Python program which asks the user to enter a number (an integer) between 1 and 30 inclusive, then calculates and prints out the factorial of that number. The factorial of a number is the product of all positive integers less than or equal to that number. For example, the factorial of 5 is: $5 * 4 * 3 * 2 * 1 = 120$.

If the number entered by the user is less than 1 or greater than 30, the message: "The number is not in the correct range." should be displayed.

The following **2 examples** show the exact formatting expected for the prompts and output.

Example 1:
```
Enter a number between 1 and 30: 4
The factorial of 4 is 24
```
Example 2:
```
Enter a number between 1 and 30: 31
The number is not in the correct range.
```

```python
number = int(input("Enter a number between 1 and 30: "))

counter = number

result = 1

if counter < 1 or counter > 30:

    print("The number is not in the correct range.")

else:

    while counter > 0:

        result = result * counter

        counter = counter -1

    print("The factorial of",number,"is",result)
```

(4 marks)

27. LaTeX (10 marks)

Write the LaTeX code that will produce the following output:

<div style="border:1px solid">

<div align="center">

Terminal Velocity

I. Newton and W. Iki

Summer School 2014

</div>

1   Introduction

The *terminal velocity* of a falling object is the velocity of the object when the sum of the drag force F_d and buoyancy equals the downward force of gravity (F_G) acting on the object.

2   Physics

$$V_t = \sqrt{\frac{2mg}{\mu A C_d}} \tag{1}$$

where

- V_t is terminal velocity,

- C_d is the drag coefficient and

- μ is the density of the fluid through which the object is falling.

</div>

The following LaTeX commands have been included as a reference. You will not need to use all of these commands. Note that the basic document structure has been completed for you.

Normal commands	Environments	Math mode commands
\emph{}	itemize	$
\section{}	enumerate	\sum_{}^{}
\subsection{}	verbatim	\sum
\subsubsection{}	flushright	\frac{}{}
\textbf{}	center	\sqrt{}
\title{}	quote	\bar{}
\author{}	displaymath	\ldots
\date{}	equation	\mu
\maketitle	quotation	^
\item		_

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

\title{Terminal Velocity}
\author{I. Newton and W. Iki}
\date{Summer School 2014}
\maketitle

\section{Introduction}

The \emph{terminal velocity} of a falling object is the velocity
of the object when the sum of the drag force $F_d$ and
buoyancy equals the downward force of gravity ($F_G$) acting
on the object.

\section{Physics}

\begin{equation}
  V_t = \sqrt{\frac{2mg}{\mu AC_d}}
\end{equation}

where

\begin{itemize}
  \item $V_t$ is terminal velocity,
  \item $C_d$ is the drag coefficient and
  \item $\mu$ is the density of the fluid through which the
object is falling.
\end{itemize}

\end{document}
```
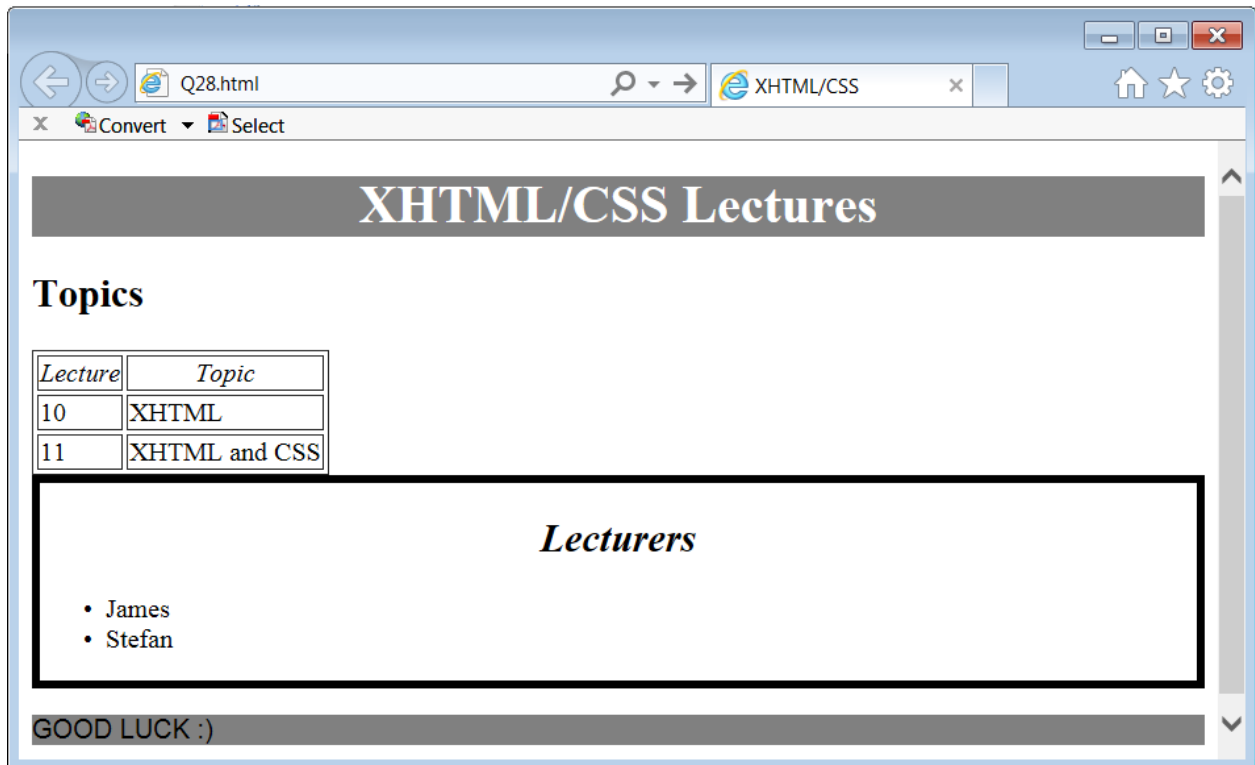
(10 marks)

28. XHTML and CSS (10 marks)

The following screenshot shows a web page created using XHTML 1.0 strict and Cascading
Style Sheets:

Complete the XHTML code below so that it produces the output shown above.

You **must** use the styles defined in the internal style sheet in the head section below, and
must not define any new styles.

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE html
     PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
     "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">

<head>
 <title>XHTML/CSS</title>

 <style type="text/css">
  h1 {text-align:center; background-color: gray; color: white;}

   .sloping {font-style: italic; text-align:center;}

   #message {background-color:gray; font-family:sans-serif;
             text-transform: uppercase;}

   .enclose {border-color: black; border-style: solid; border-width: thick;}
 </style>
</head>
```

```
<body>
```

<!-- XHTML/CSS Lectures heading -->

```
<h1>XHTML/CSS Lectures</h1>
```

(1 mark)

<!-- Topics Heading.-->

```
<h2>Topics</h2>
```

(1 mark)

<!-- Topics table with 2px border -->

```
<table border = "2px">
  <tr class = "sloping">
     <td>Lecture</td><td>Topic</td>
  </tr>
  <tr>
     <td>10</td><td>XHTML</td>
  </tr>
  <tr>
     <td>11</td><td>XHTML and CSS</td>
  </tr>
</table>
```

(3 marks)

<!-- Begin Lecturers section -->

```
<div class = "enclose">
```

(0.5 marks)

```
<!--Lecturers Heading -->
```

```
<h2 class = "sloping">Lecturers</h2>
```

(1 mark)

```
<!-- List of Lecturers -->
```

```
<ul>
    <li>James</li>
    <li>Stefan</li>
</ul>
```

(2 marks)

```
<!-- End of Lecturers Section -->
```

```
</div>
```

(0.5 marks)

```
<!-- Good luck message -->
```

```
<p id = "message">Good luck :)</p>
```

(1 mark)

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

29. Spreadsheets (10 marks)

	A	B	C	D	E
1	Car Type	Purchase Price	Registration	Insurance	Overall Cost
2	Toyota Corolla	12,000	431	553.75	12,984.75
3	Honda Accord	21,000	431	698.45	22,129.45
4	Holden Commodore	35,000	462	831.32	36,293.32
5	Subaru Impreza	8,000	431	771.56	9,202.56

(a) In the Microsoft Excel spreadsheet above, the values in Columns B, C and D are added together to give the corresponding values in Column E. What is the best formula to use in **Cell E2**? You must ensure that your formula is able to be filled down.

```
=SUM(B2:D2)
```

(1 mark)

	A	B	C
1	Car Type	Engine (ccm)	Registration Cost ($)
2	Toyota Corolla	1800	431
3	Honda Accord	2000	431
4	Holden Commodore	3600	462
5	Subaru Impreza	2000	431

(b) In the Microsoft Excel spreadsheet above, the contents of each cell in Column C depends on the value of the corresponding cell in Column B. For engines with up to and including 2000 ccm, the cost of registration is $431. For engines with more than 2000 ccm, the cost of registration is $462. You need to fill in the best formula to use in **Cell C2**.

Note: you must use an IF function in this cell and you must ensure that your formula is able to be filled down.

```
=if( B2 <= 2000, 431, 462)
```

(3 marks)

	A	B	C
1	Car Type	Fuel usage (litres per 100 km)	Fuel Economy Rating
2	Toyota Corolla	6.2	●●●●
3	Honda Accord	7.4	●●●
4	Holden Commodore	11.3	●
5	Subaru Impreza	8.1	●●●
6			
7			
8	Fuel Economy Rating Table		
9	Fuel usage (litres per 100 km)	Fuel Economy Rating	
10	0	●●●●●	
11	3.3	●●●●	
12	6.5	●●●	
13	9	●●	
14	11	●	

(c) The Microsoft Excel spreadsheet above calculates the Fuel Economy Rating of the listed cars. The computed ratings listed in Column C depend on the Fuel Usage (litres per 100 km) in Column B and are determined using the Fuel Economy Rating Table (Cells A10:B14).

What is the best formula to use in **Cell C2**? Your formula should look up the Fuel usage in the Fuel Economy Rating Table and retrieve the appropriate Fuel Economy Rating. Note: You must ensure that your formula is able to be filled down.

The syntax of the **vlookup** function to search the first column of a table, and then return a value from any cell on the same row of the table is given below:

```
vlookup(lookup_value, table_array, col_index_num,[range_lookup])
```

```
=vlookup(B2, $A$10:$B$14, 2, TRUE)
```

(4 marks)

	A	B	C	D
1	Car Type	Fuel usage (litres per 100 km)	Cost ($) of driving 15,000 km using 95 octane	Cost ($) of driving 15,000 km using diesel
2	Toyota Corolla	6.2	2035.77	1431.27
3	Honda Accord	7.4	2429.79	1708.29
4	Holden Commodore	11.3	3710.355	2608.605
5	Subaru Impreza	8.1	2659.635	1869.885
6				
7				
8	Fuel Price ($) per Litre 95 Octane	Fuel Price ($) per Litre diesel		
9	2.189	1.539		

(d) In the Microsoft Excel spreadsheet above, the cells in Column B of Rows 2 – 5 represent the fuel usage in litres per 100 km for each particular car type, the cells in Column C of Rows 2 - 5 represent the cost of driving 15,000 km using 95 Octane fuel, and the cells in Column D of Rows 2 – 5 represent the cost of driving 15,000 km using diesel fuel. The contents of each cell in Columns C and D depend on the value of the corresponding cell in Column B, a driving distance of 15,000 km and the appropriate fuel price from the Fuel Price table in Cells A9 and B9.
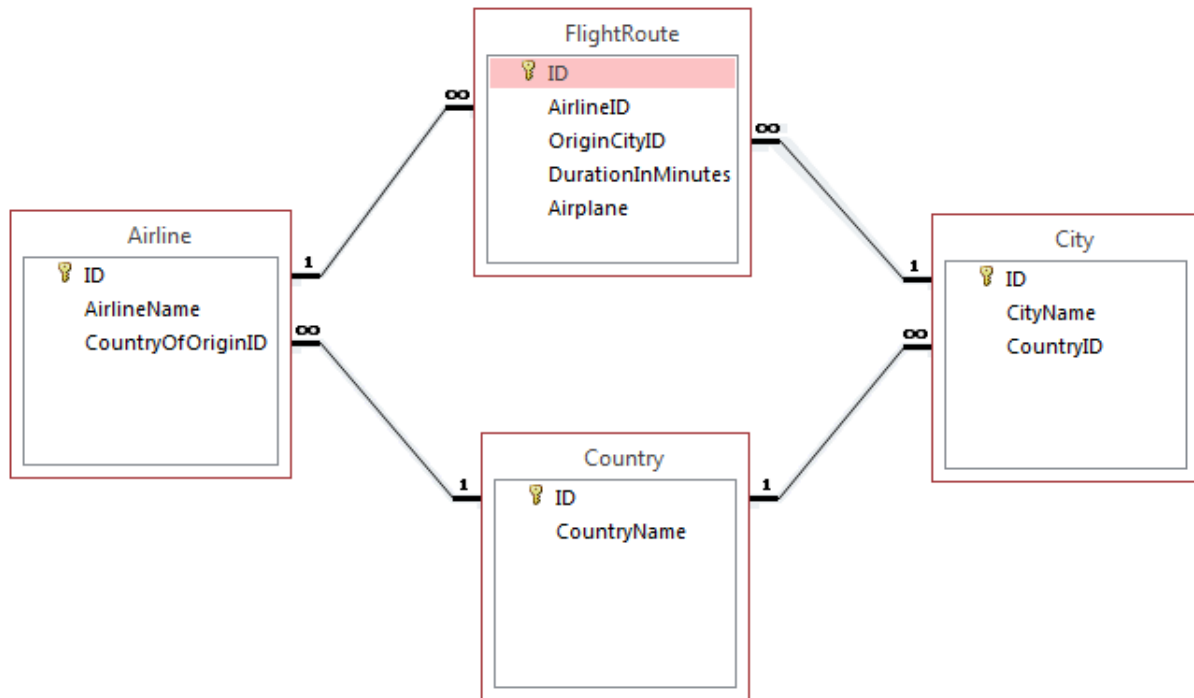
What is the best formula to use in **Cell C2**? You must ensure that your formula is able to be filled down **and** right.

=$B2 * A$9 * 150

(2 marks)

30. Databases (10 marks)

Use the following Microsoft Access relationship diagram to answer the questions in this section. Note that the primary key of each table uses the AutoNumber type to ensure uniqueness.

(a) List all the foreign keys in the Microsoft Access relationship diagram above.

AirlineID
CountryOfOriginID
CountryID
OriginCityID

(2 marks)

(b) What is an appropriate data type for the **DurationInMinutes** field in the **FlightRoute** table?

Number

(1 mark)

(c) These are the contents of the **Airline** table.

ID	AirlineName	CountryOfOriginID
1	Air New Zealand	1
2	Quantas	2
3	Virgin Australia	2
4	United Airlines	3
5	Delta Airlines	3
6	American Airlines	3

Based on these entries in the **Airline** table, write an SQL expression that queries the **FlightRoute** table and lists **DurationInMinutes** and **Airplane** of all flight routes by **Delta Airlines**. Some example results might be:

DurationInMinutes	Airplane
245	Airbus A380
660	Boeing 747
95	Boeing 737

```
SELECT DurationInMinutes, Airplane
FROM FlightRoute
WHERE AirlineID=5;
```

(3 marks)

(d) Complete the Query By Example (QBE) form below so that it generates a query that displays the **AirlineName**, **Airplane** and **CityName** of all **FlightRoutes** with a **DurationInMinutes** of **more than 100.** Some example results might be:

AirlineName	Airplane	CityName
Delta Airlines	Airbus A380	Auckland
Delta Airlines	Boeing 747	Christchurch
Air New Zealand	Boeing 767	Wellington
United Airlines	Airbus A320	Sydney

Field:	AirlineName	Airplane	CityName	DurationInMinutes
Table:	Airline	FlightRoute	City	FlightRoute
Sort:				
Show:	✔	✔	✔	☐
Criteria:				>100
or:				

(4 marks)