

THE UNIVERSITY OF AUCKLAND

SUMMER SEMESTER, 2016
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	Sample
Forename(s)	Answers
Student ID	
Login (UPI)	

	Question	Mark	Out Of
1 - 25	Multiple Choice		50
26	Spreadsheets		10
27	Databases		10
28	LaTeX		10
29	HTML5 and CSS		10
30	Programming Using Python		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] Two computers have the following specifications:

Computer A	Computer B
<ul style="list-style-type: none">• Intel Core i5 processor at 2GHz• 8GB DDR3 RAM• Intel Iris Pro internal graphics• 128GB SSD• Windows 10	<ul style="list-style-type: none">• Intel Xeon processor at 3.5GHz• 16GB DDR3 RAM• Intel HD internal graphics• 1TB HDD• Windows 10

Based on this information, which one of the following statements is TRUE?

- (a) Computer B's primary memory is likely to be faster than Computer A's primary memory.
- (b) Computer A uses built-in graphics while Computer B uses discrete graphics.
- (c) Computer A has more primary memory than Computer B.
- (d) Computer B's CPU has a lower clock speed than Computer A's CPU.
- (e) Computer A's secondary memory is likely to be faster than Computer B's secondary memory.

Question 2

[2 marks] Which one of the following is an example of an output device?

- (a) Printer.
- (b) Voice recognition.
- (c) Webcam.
- (d) Keyboard.
- (e) Mouse.

Question 3

[2 marks] What is a nibble?

- (a) A group of 8 bits.
- (b) A group of 4 bits.
- (c) There is no such thing as a nibble in Computer Science.
- (d) A type of connector used in a computer system.
- (e) A group of 4 bytes.

Question 4

[2 marks] What range of decimal numbers can you generate using a 5-bit binary number?

- (a) 0 to 50.
- (b) 0 to 10.
- (c) 0 to 25.
- (d) 0 to 4.
- (e) 0 to 31.

Question 5

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

- (a) Some file formats are proprietary and some file formats are open and free to use.
- (b) A program will generally be unable to read a file that uses a file format that it does not understand.
- (c) File formats can be based on a standard.
- (d) File formats are used by the operating system to determine which program to use to open a particular file.
- (e) PDF is an example of a file format.

Question 6

[2 marks] What is the main difference between a CLI and a GUI?

- (a) A CLI is a text-based user interface while a GUI is a graphically-based user interface.
- (b) A GUI allows the user to perform more tasks than a CLI.
- (c) A GUI can only be used by new computer users while a CLI can only be used by experienced computer users.
- (d) CLI and GUI are two different file formats.
- (e) CLI interfaces are always in black and white while GUI interfaces are always in colour.

Question 7

[2 marks] Which one of the following protocols would NOT be used by an email client?

- (a) SMTP
- (b) IMAP
- (c) POP3
- (d) FTP
- (e) None of the above protocols would be used by an email client.

Question 8

[2 marks] Which one of the following statements about UDP and TCP is TRUE?

- (a) UDP can transfer data faster than TCP, but TCP transfers data more reliably.
- (b) TCP only works on packet-switching networks while UDP only works on circuit-switching networks.
- (c) UDP can regulate the flow of packets if the network is busy, but TCP cannot do this.
- (d) TCP would be better suited than UDP for transmitting a real-time video stream across the Internet.
- (e) UDP is only used by email clients while TCP is only used by web browsers.

Question 9

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

- (a) Ray Tomlinson sent the first email.
- (b) Emails are sent to the mail server using SMTP.
- (c) Emails are asynchronous.
- (d) Emails are retrieved from the mail server using IMAP or POP3.
- (e) All of the above.

Question 10

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

- (a) Many email clients offer spam filters.
- (b) Spam is considered to be a nuisance but is legal in New Zealand.
- (c) Spam is named after canned meat.
- (d) Spam can include scams like phishing.
- (e) None of the above.

Question 11

[2 marks] What Wiki markup would you use to create an external link to this semester's COMPSCI111 home page that uses the label "COMPSCI111"? You can assume that the URL of the home page is:

`https://www.cs.auckland.ac.nz/courses/compsci111ssc/`

- (a) `[https://www.cs.auckland.ac.nz/courses/compsci111ssc/ COMPSCI111]`
- (b) `[[https://www.cs.auckland.ac.nz/courses/compsci111ssc/ COMPSCI111]]`
- (c) `[https://www.cs.auckland.ac.nz/courses/compsci111ssc/|COMPSCI111]`
- (d) `[[https://www.cs.auckland.ac.nz/courses/compsci111ssc/|COMPSCI111]]`
- (e) None of the above.

Question 12

[2 marks] Which of the lists below is produced by the following Wiki markup?

*Best Games of 2015:

*#Rise of the Tomb Raider

*#The Witcher 3

- (a)

<ul style="list-style-type: none">▪ Best Games of 2015:<ul style="list-style-type: none">▪ Rise of the Tomb Raider▪ The Witcher 3
--

- (b)

<ol style="list-style-type: none">1. Best Games of 2015:<ol style="list-style-type: none">1. Rise of the Tomb Raider2. The Witcher 3

- (c)

<ul style="list-style-type: none">▪ Best Games of 2015:<ol style="list-style-type: none">1. Rise of the Tomb Raider2. The Witcher 3
--

- (d)

<ol style="list-style-type: none">1. Best Games of 2015:<ul style="list-style-type: none">▪ Rise of the Tomb Raider▪ The Witcher 3

(e) None of the above.

Question 13

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

- (a) HTML is used to create hypertext documents.
- (b) IP is responsible for routing packets of information from a source host to a destination host.
- (c) TCP works in conjunction with IP to ensure packets are delivered reliably, in order, and are error-checked.
- (d) The DNS caches web pages so that they can be retrieved quickly.
- (e) HTTP is responsible for the transfer of hypertext documents over the WWW.

Question 14

[2 marks] Which of the following keeps track of your web browsing?

- (a) Your operating system.
- (b) Your ISP.
- (c) Your web browser.
- (d) The web servers contacted.
- (e) All of the above.

Question 15

[2 marks] What is the ASCII code for the word “Exams”?

- (a) 69 88 65 77 83
- (b) 69 119 96 108 114
- (c) 69 120 97 109 115
- (d) 101 120 97 109 115
- (e) 69 87 64 76 82

Question 16

[2 marks] Which of the following is an advantage of RefWorks?

- (a) RefWorks can be accessed from any Internet connected computer.
- (b) RefWorks is compatible with multiple operating systems.
- (c) Courses and tutorials on RefWorks are readily available from libraries and learning centres.
- (d) RefWorks is free to use for students at this university.
- (e) All of the above.

Question 17

[2 marks] Which of the following is an example of weak AI?

- (a) KITT.
- (b) MYCIN.
- (c) Skynet.
- (d) HAL 9000.
- (e) BB-8.

Question 18

[2 marks] Which of the following statements regarding AI is FALSE?

- (a) Actuators let an agent make actions on their environment.
- (b) Deep Blue is a chess playing computer.
- (c) Percepts let an agent make observations of their environment.
- (d) An inference engine is a collection of If-Then rules.
- (e) None of the above.

Question 19

[2 marks] What would be the least number of bits required to represent 24 colours?

- (a) 6 bits.
- (b) 7 bits.
- (c) 5 bits.
- (d) 4 bits.
- (e) None of the above.

Question 20

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

- (a) The PNG format uses lossy compression.
- (b) Vector graphics are good for photographs.
- (c) The JPEG format uses lossless compression.
- (d) The GIF format supports animated images.
- (e) The GIF format supports 16 million colours.

Question 21

[2 marks] In game design, what are aesthetics?

- (a) The emotions evoked by the game.
- (b) A synonym for genre.
- (c) The way the game looks.
- (d) The cumulative effect of thousands of micro design decisions.
- (e) The style of the game's artwork.

Question 22

[2 marks] What is wrong with bi-polar morality scales in games?

- (a) They are offensive to the mentally ill.
- (b) They interfere with embedded narratives.
- (c) They inhibit roleplay.
- (d) They reduce re-playability.
- (e) They reduce spatial presence.

Question 23

[2 marks] Which of the following is BAD advice for giving presentations?

- (a) End your presentation by thanking the audience.
- (b) Alternate between context and specifics.
- (c) Rehearse your presentation thoroughly.
- (d) Speak clearly and precisely.
- (e) Use comprehensive bullet points to convey your message.

Question 24

[2 marks] Social media and traditional media can make people unhappy by ...

- (a) accelerating our hedonic treadmill.
- (b) neurological pruning.
- (c) creating unrealistic expectations.
- (d) triggering dissociative personality disorder.
- (e) providing learning opportunities.

Question 25

[2 marks] Which of the following is most important for user experience design?

- (a) Depth.
- (b) The ratio of depth to complexity.
- (c) The ratio of usefulness to ease of use.
- (d) Usefulness.
- (e) Simplicity.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

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.

26. Spreadsheets (10 marks)

Steve's Stationery is a small stationery store. The following spreadsheet displays sales information for selected stationery products sold by five salespeople in Steve's Stationery.

	A	B	C	D	E	F	G	H
1	Steve's Stationery							
2								
3	Salesperson	Pencils sold	Calculators sold	Markers sold	Total items sold	Total value of items sold	Sales performance	Sales bonus
4	James	45	10	340	395	\$416.05	Excellent	\$41.61
5	Tom	67	34	109	210	\$553.90	Very good	None
6	Evon	89	22	156	267	\$443.73	Excellent	\$44.37
7	Lydia	108	9	189	306	\$308.34	Excellent	\$30.83
8	Jean	23	12	130	165	\$267.55	Good	None
9								
10								
11								
12	Item	Sale price			Items sold	Rating		
13	Pencils	\$0.39			0	Very poor		
14	Calculator	\$12.99			50	Poor		
15	Markers	\$0.79			100	Average		
16					150	Good		
17					200	Very good		
18					250	Excellent		

- (a) Cell **E4** calculates the total number of stationery items sold by a salesperson. What is the best formula to use in Cell **E4**? Your formula must be able to be filled down from **E4** to **E8** correctly.

= SUM (B4 : D4)

(1 mark)

- (b) Cell **F4** calculates the total value of all the items sold by a salesperson. The amount of each item sold is multiplied by the appropriate price from Cells B13, B14 or B15. What is the best formula to use in Cell **F4**? Your formula must be able to be filled down from **F4** to **F8** correctly.

```
= B4 * $B$13 + C4 * $B$14 + D4 * $B$15
```

(2 marks)

- (c) Cell **G4** contains an evaluation of a salesperson's performance based on the total number of items that they have sold (i.e. the value in cell E4). What is the best formula to use in Cell **G4**? Your answer must use the **VLOOKUP** function to retrieve the appropriate rating from the table in Cells **E13:F18**. The VLOOKUP function has the following syntax:

```
VLOOKUP(lookup_value, table_array, col_index_num, range_lookup)
```

Note: Your formula must be able to be filled down from **G4** to **G8** correctly.

```
= VLOOKUP( E4, $E$13:$F$18, 2, TRUE )
```

(4 marks)

- (d) Cell **H4** displays the Sales bonus for a salesperson (if they have earned one). If the salesperson's Sales Performance is evaluated as "Excellent", then they receive a bonus calculated as 10% of the total value of the items that the salesperson has sold. However, if the salesperson's Sales Performance has not been evaluated as "Excellent", the word "**None**" should be displayed in Cell **H4**. What is the best formula to use in Cell **H4**? Your answer must use an **IF** function.

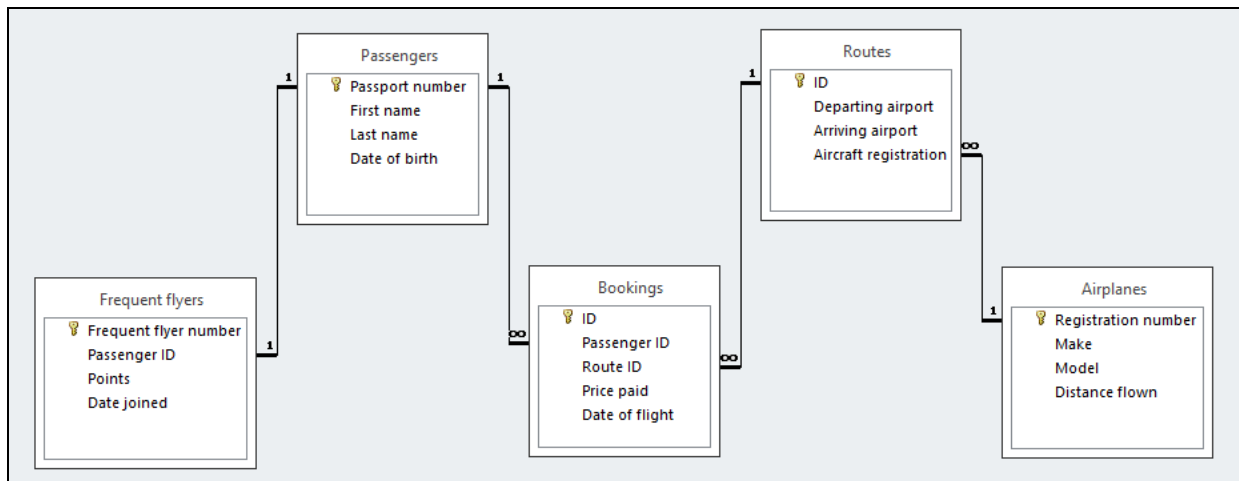
Note: Your formula must be able to be filled down from **H4** to **H8** correctly.

```
= IF ( G4 = "Excellent", F4 * 0.1, "None" )
```

(3 marks)

27. Databases (10 marks)

QuikAir is a small airline that uses a database to manage its flights and customer bookings. Use this database, as shown in the following Relationships diagram, to answer the questions.



- (a) State the foreign key field(s) in the **Bookings** table (if any).

Passenger ID and Route ID

(1 mark)

- (b) What is the most appropriate data type for the **Last name** field in the **Passengers** table?

Short Text

(1 mark)

- (c) There is a one-to-one relationship between the **Passport number** field in the **Passengers** table and the **Passenger ID** field in the **Frequent flyers** table.

In contrast, there is a one-to-many relationship between the **Passport number** field in the **Passengers** table and the **Passenger ID** field in the **Bookings** table.

Explain why these relationships were set up in this way.

A one-to-one relationship has been created between the fields because each passenger can only be given one Frequent Flyer number. The relationship implements this by ensuring that a passenger's passport number can only appear once in the Passenger ID field of the Frequent flyers table.

A one-to-many relationship has been created between the fields because each passenger can have multiple bookings. The relationship implements this by permitting a passenger's passport number to appear multiple times in the Passenger ID field of the Bookings table.

(2 marks)

- (d) Complete the Query By Example (QBE) form below so that it generates a query that displays the **first name, last name, number of Frequent Flyer points** and the **date on which the passenger joined** the Frequent Flyer program. The query should only display passengers with more than 15,000 points. The query should sort the results in **descending order** based on the **number of points** that a passenger has. Some example results from the query might be:

First name	Last name	Points	Date joined
Tom	Bloggs	165489	01-Aug-13
Steve	Smith	15487	05-Jul-01

Field:	First name	Last name	Points	Date joined
Table:	Passengers	Passengers	Frequent flyers	Frequent flyers
Sort:			Descending	
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:			>15000	

(3 marks)

- (e) Write an SQL query that displays the **booking ID, route ID, date of flight** and the **price paid**. The query should only display bookings with a **route ID** of 3. The results should be sorted in **descending** order based on the **date of the flight**. Some example results from the query might be:

ID	Route ID	Date of Flight	Price paid
6	3	08-Dec-15	\$336.98
4	3	09-Sep-15	\$458.00
1	3	18-Aug-15	\$154.69
2	3	04-May-15	\$236.78

```

SELECT ID, [Route ID], [Date of Flight], [Price paid]
FROM Bookings
WHERE [Route ID] = 3
ORDER BY [Date of Flight] DESC;

```

(3 marks)

28. LaTeX (10 marks)

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

Brownian Motion

R. Brown and A. Einstein

Summer School Exam

1 Introduction

Brownian motion describes the random motion of particles suspended in a fluid resulting from their collision with the atoms or molecules in the fluid.

- First observed by Robert Brown in 1827.
- Mechanism behind motion explained by Einstein in 1905.

2 Einstein's Theory

$$\rho(x, t) = \frac{N}{\sqrt{4\pi Dt}} e^{-\frac{x^2}{4Dt}}$$

where N is the number of particles at the initial time $t = 0$ and D is the **diffusion coefficient**.

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.

<i>Normal commands</i>	<i>Environments</i>	<i>Math mode commands</i>
<code>\emph{}</code>	itemize	<code>\$</code>
<code>\section{}</code>	enumerate	<code>\sqrt{}</code>
<code>\subsection{}</code>	verbatim	<code>\infty</code>
<code>\subsubsection{}</code>	flushright	<code>\frac{ }{ }</code>
<code>\large</code>	center	<code>\rho</code>
<code>\textbf{}</code>	quote	<code>\pi</code>
<code>\title{}</code>	displaymath	<code>\geq</code>
<code>\author{}</code>	equation	<code>\sum_{ }^{ }</code>
<code>\date{}</code>	quotation	<code>^</code>
<code>\maketitle</code>		<code>-</code>
<code>\item</code>		

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

\title{Brownian Motion}
\author{R. Brown and A. Einstein}
\date{Summer School Exam}
\maketitle

\section{Introduction}

\emph{Brownian motion} describes the random motion of particles suspended
in a fluid resulting from their collision with the atoms or molecules in the fluid.
\begin{itemize}
\item First observed by Robert Brown in 1827.
\item Mechanism behind motion explained by Einstein in 1905.
\end{itemize}

\section{Einstein's Theory}

\begin{displaymath}
\rho(x,t) = \frac{N}{\sqrt{4\pi Dt}} e^{-\frac{x^2}{4Dt}}
\end{displaymath}
where  $N$  is the number of particles at the initial time  $t=0$ , and  $D$  is the
\textbf{diffusion coefficient}.

\end{document}
```

(10 marks)

29. HTML5 and CSS (10 marks)

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

TENNIS

[Tennis](#) is a racket sport that can be played individually against a single opponent (singles) or between two teams of two players each (doubles).

BEST MALE PLAYERS

Based on the ATP rankings, the *top 3 male players* are:

1. Novak Djokovic
2. Andy Murray
3. Roger Federer

BEST FEMALE PLAYERS

Based on the WTA rankings, the *top 3 female players* are:

1. Serena Williams
2. Simona Halep
3. Garbine Muguruza

GRAND SLAMS

There are 4 Grand Slam tournaments, also referred to as *majors*:

Major	Month(s) Held
Australian Open	January
French Open	May/June
Wimbledon	June/July
US Open	August/September

Complete the HTML5 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.

Note: The URL for the Wikipedia webpage on tennis is:
 "https://en.wikipedia.org/wiki/Tennis/".

```
<!DOCTYPE html>
<html>
<head>
```



```
<meta charset="UTF-8">
<title>HTML5 Exam Question</title>
<style type="text/css">
h1, h2 { background-color: #404040; font-variant: small-caps;
         font-family: sans-serif; color: #FFFFFF; }
table, tr, td { border: 1px solid black; }
#tableheader { font-size: large; font-weight: bold; text-align: center; }
.highlight { font-size: large; font-weight: bold; font-style: italic; }
</style>
</head>
```

```
<body>
```

```
<!-- Main Heading -->
```

```
h1>Tennis</h1>
```

(0.5 marks)

```
<!-- Introductory Paragraph -->
```

```
<p>
```

```
<a href="https://en.wikipedia.org/wiki/Tennis">Tennis</a>
```

```
is a racket sport that can be played individually
against a single opponent (singles) or between two teams
of two players each (doubles).
```

```
</p>
```

(1.5 marks)

```
<!-- Best Male Players Section -->
```

```
<section>
```

```
<h2>Best Male Players</h2>
```

```
<p>
```

```
Based on the ATP rankings, the
```

```
<span class = "highlight">top 3 male players</span> are:
```

```
</p>

<ol>

  <li>Novak Djokovic

  <li>Andy Murray

  <li>Roger Federer

</ol>

</section>
```

(2 marks)

```
<!-- Best Female Players Section -->
```

```
<section>

<h2>Best Female Players</h2>

<p>

Based on the WTA rankings, the

<span class="highlight">top 3 female players</span> are:

</p>

<ol>

  <li>Serena Williams

  <li>Simona Halep

  <li>Garbine Muguruza

</ol>

</section>
```

(2 marks)

```
<!-- Grand Slams Section -->
```

```
<section>
<h2>Grand Slams</h2>
<p>
There are 4 Grand Slam tournaments, also referred to as
<span class="highlight">majors</span>:
</p>
<table>
  <tr id = "tableheader">
    <td>Major</td> <td>Month(s) Held</td>
  </tr>
  <tr>
    <td>Australian Open</td>
    <td>January</td>
  </tr>
  <tr>
    <td>French Open</td>
    <td>May/June</td>
  </tr>
  <tr>
    <td>Wimbledon</td>
    <td>June/July</td>
  </tr>
  <tr>
    <td>US Open</td>
    <td>August/September</td>
  </tr>
</table>
</section>
```

(4 marks)

</body>
</html>

30. Programming Using Python (10 marks)

(a) Show the output from the following Python program.

```
print("Start")
x = 0
y = 2
z = 50
while x < z:
    if z % 2 == 0:
        x = y - 1
    else:
        x = y - 2
    z = z // x
    y = y + 1
    print(x)
print("End")
```

```
Start
1
2
2
4
End
```

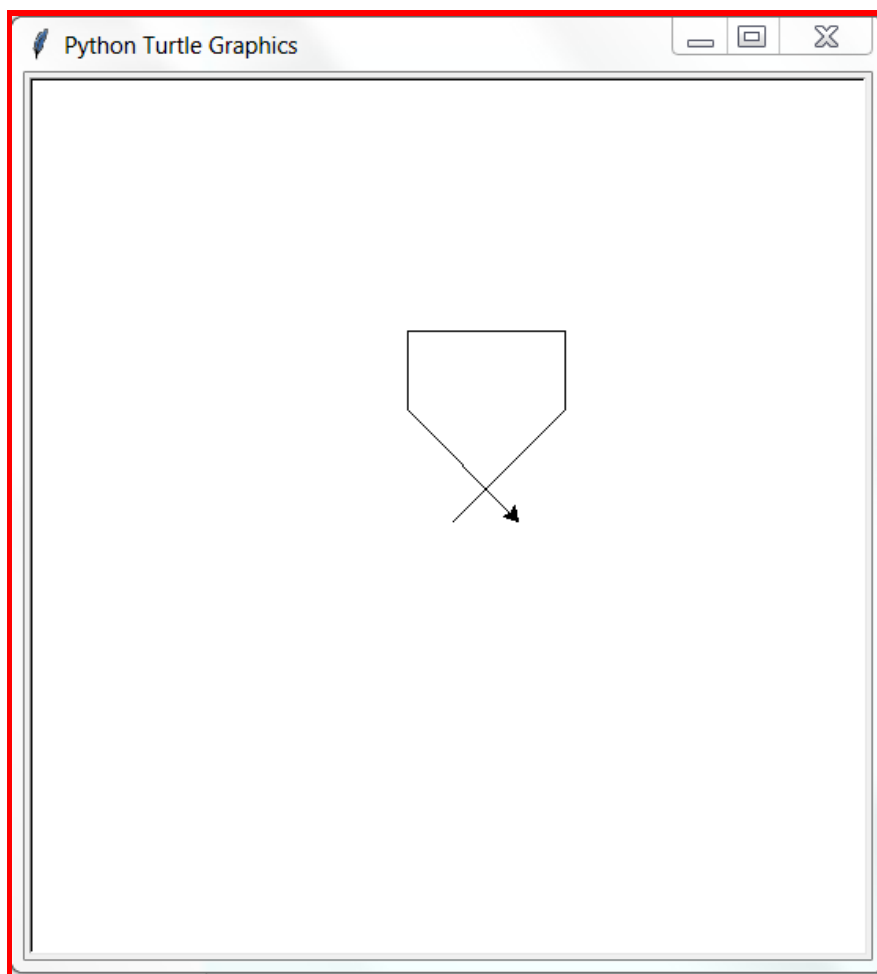
(3 marks)

- (b) Use the Python window below to 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.

```
import turtle
angle = 45
long_line = 100
short_line = 50

turtle.left(angle)
turtle.forward(long_line)
turtle.left(angle)
count = 0
while count < 3:
    if count == 1:
        turtle.forward(long_line)
    else:
        turtle.forward(short_line)
    turtle.left(angle * 2)
    count = count + 1

turtle.right(angle)
turtle.forward(long_line)
```



(3 marks)

- (c) Write a Python program that prompts the user to enter a number between 1 and 100 inclusive. As long as the user enters a number that is not in this range, your program must inform them of their error and prompt them to try again as in the example below.

Once the user has entered a valid number, the program will then prompt the user to enter a percentage amount. Finally the program prompts the user to enter '+' to add the percentage amount to the number or '-' to subtract the percentage amount.

After getting the input from the user, the program must calculate the final amount by adding or subtracting the percentage amount from the number, then display the final amount as in the example below.

You can assume that the user will only enter whole numbers. The following **example** shows the exact formatting expected for the prompts and output.

Example:

```
Enter a number between 1 and 100: 0
That number was incorrect.

Enter a number between 1 and 100: 51
Enter a percentage: 10
Enter '+' to add OR '-' to subtract the percentage: +
The final amount is 56.1
```

```
number = int(input("Enter a number between 1 and 100: "))

while number < 1 or number > 100:
    print("That number was incorrect.")
    print()
    number = int(input("Enter a number between 1 and 100: "))

percentage = int(input("Enter a percentage: "))
option =
input("Enter '+' to add OR '-' to subtract the percentage: ")

if option == "+":
    finalAmount = number * (1 + percentage / 100)
else:
    finalAmount = number - (number * (percentage / 100))

print("The final amount is", finalAmount)
```

(4 marks)