Chapter 7 Student Book Answers

What you should already know

1   **a,b** An expert system

- is an example of AI
- is a computer system that emulates a human expert in a number of areas
- is made up of an inference engine, rules base, interface, explanation system and knowledge base
- uses the inference engine to apply rules to known facts (which make up the knowledge base) to make decisions and conclusions
- can also give explanations for the reasoning used to draw conclusions.

c

- medical diagnosis
- fault finding in engines and electronic devices
- oil and mineral exploration
- playing strategy games such as chess
- ability to identify plants, animals, chemical compounds, etc.
- financial advice, for example, tax calculations

2   **a**   Copyright is a protection that covers electronic and paper-based resources from illegal copying and distribution.

b

- Without copyright there would be no way of preventing anybody copying something and selling it without the originators receiving any fees.
- Since the originators spent time and money developing the resource, it would be legally and morally unfair to allow anyone to make illegal copies.

c

- software
- articles (such as books)
- new scientific research
- designers (for example, cars, furniture, ceramics, etc.)

d

- Plagiarism is when a person uses ideas from existing work in their own work and claiming they wrote/developed it …
- … without any reference to the originators.

3   **a**   **i)**   manual factory: admin and assembly jobs are lost …

… but jobs are created in writing software, running and installing IT systems, etc.

ii)

- Generally improves the environment since computer-based systems can save, for example, on heating and lighting.
- Also leads to more efficient running of devices which are computer-controlled.

iii)

- Online banking and commerce is leading to the closure of high street banks and shops in towns and cities.
- This leads to job losses and creation of 'ghost towns'.

iv)

- Human interactions become reduced as people spend more and more time using computer devices such as games, texting on mobile phones …
- … leading to reduction in verbal and written communication.
- Recent research has shown that on average we check our phones every 12 minutes and it is the first thing we check on waking up in the morning!

b   Positive impacts

- job increases
- greater communication with people around the world
- greater ability to search for information quickly (5 seconds on a search engine can reveal thousands of webpage resources).

4   a

- Fake news can be posted on any social media platform.
- It has become an epidemic leaving users uncertain of the truth.
- Articles are designed to misinform or deceive readers.
- It is argued that fake news helped in the USA election of 2017 and in the 2016 UK referendum (although at the time of writing these two statements had yet to be proved right or wrong).
- Because the internet is not policed, people can publish anything they want playing on the public's fears and prejudices; the information can come from what appear to be trusted sources.
- Because a large number of people have internet access, it is very powerful tool and arguments rage as to how much censorship should exist within social media companies.
- There are 5 types of fake news:

click bait	stories fabricated to gain website readers and increase advertising revenue; they are sensational headlines designed to grab reader's attention
propaganda	stories created to deliberately mislead audiences and promote bias
satire and parody	publishing fake news for entertainment purposes
sloppy journalism	journalists publishing stories without first checking the validity/credentials of their information sources
misleading headlines	headlines that distort the facts leading to sensationalist stories , for example,'man beats wife' – could this mean a vicious attack or did a man simply win an argument? You decide!

b

- World safety is at risk since terrorist groups can use electronic media to spread their extreme views and therefore corrupt vulnerable people.
- Using phone encryption can make it difficult to understand covert messages being transmitted around the world.

c
- People publishing information on social media aimed at causing embarrassment and harm.
- Hate mail has been on the rise recently since people think that comments published online are not liable to the same prosecution or they hide behind relative anonymity (although this, of course, incorrect).

d This is covered in **(i)** above since fake news can affect election results.

Activity 7A

1
- Computer ethics is a set of principles set out to regulate the use of computers.
- Three factors should be considered
  - intellectual property rights – this covers, for example, copying of software without the permission of the owner
  - privacy issues – this covers, for example, hacking or any illegal access to another person's personal data
  - effect of computers on society – this covers factors such as job losses, social impacts and so on.
- Use of the internet has led to an increase in plagiarism – this is when a person takes another person's idea/work and claims it was their own idea/work.
- While it is perfectly fine to quote another person's idea, it is essential that some acknowledgement is made so that the originator of the idea/work is known to other
- … this can be done by
  - a series of references at the end of a document …
  - … or footnotes on each page where a reference needs to be made
  - software exists that can scan text and then look for examples of plagiarism by searching web pages on the internet.

2
- Recent events in hacking (for example, the hacking of Sony Films in USA) and in terrorism (for example, the 2015 terrorist attacks in France) bring increasing pressure from many people to start policing the internet.
- Those that support freedom of speech argue that the internet only works because it isn't policed.
- Many security departments and governments believe that the hacking and terrorism attacks could have been stopped by having tighter laws …
- … allowing them to 'eavesdrop' on any data transmission on the internet.
- There are many points that support both sides of the argument.

Arguments in favour of some form of internet control
- It would prevent illegal material being posted on websites (for example, racist comments, pornography, terrorist activities, and so on).
- People find it much easier to discover information which can have serious consequences (for example, how to be a hacker, how to make a bomb, and so on) …
- … although this can be found in books, it is much easier for a novice to find the required information using a search engine.

- Some form of control would prevent children and other vulnerable groups being subjected to undesirable websites.

- Some form of control would stop incorrect information being published on websites.

Arguments against some form of internet control

- Material published on websites is already available from other sources.

- It would be very expensive to 'police' all websites and users would have to pay for this somehow.

- It would be difficult to enforce rules and regulations on a global scale.

- It can be argued that policing would go against freedom of information/speech.

- Many topics and comments posted on websites are already illegal and laws already exist to deal with the offenders.

- Who is to decide what is illegal or offensive – many things are only offensive to certain people (for example, religious comments) but not to the majority.

3

- **Legal** covers the law – whether an action is punishable by law.

- **Morality** governs the private and personal interactions between people.

- **Ethics** governs professional interactions.

- **Culture** refers to the attitudes, values and practices shared by a society or group of people.

- Morality covers the human desire to distinguish between right and wrong …

- … the only problem here is that culture can get in the way …

- … what may be immoral in some cultures is regarded as acceptable practice in other cultures …

- … because something is immoral, it isn't necessarily illegal.

- Altering websites or creating fake websites is not in itself illegal …

- … provided the person who carries out the act doesn't try to gain from their actions

- … it is simply an immoral act since it can cause distress to others who aren't aware that it was simply a harmless prank …

- … as soon as they try to obtain personal and financial data then it becomes an illegal act.

- Some people regard hacking as simply immoral – this again ceases to be true if the act of hacking leads to breaking national security, or financial gain or leads to revealing personal information which leads to distress …

- … it can be a very thin dividing line between an immoral act and an illegal act.

- Unethical behaviour is essentially breaking a code of conduct …

- … for example, if somebody works for a software company and passes on some of the ideas to a rival company, this would be regarded as unethical behaviour …

- … unless the software passed on is part of national security, then it isn't actually illegal to do this

- the importance of culture is less tangible …

- … writing software games that make fun of religion could be seen by certain people as unacceptable behaviour …

- … but some cultures would find it funny and wouldn't understand why it was seen as offensive

- … when writing computer games, for example, programmers need to be careful that they don't include items which some cultures would find offensive or obscene …

- again this may not be seen as unethical and certainly not illegal, but nonetheless can cause distress.

Activity 7B

1 a Software is making and distributing illegal copies of software. Software protected by copyright laws in much the same way as music CDs, videos and articles from magazines and books are protected.

b When software is purchased there are certain rules that must be obeyed:

- It is not legal to make a software copy and then sell it or give it away to a friend or colleague.
- Software can't be used on a network or used in multiple computers unless a licence has been acquired to allow this to happen.
- It is not legal to use coding from the copyright software in your own software and then pass this software on or sell it as your own without the permission of the copyright holders.
- Renting out of a software package without permission to do so is illegal.
- It is illegal to use the name of copyrighted software on other software without agreement to do so.
- Software piracy (illegal copies of software) is a big issue amongst software companies …
- … they take many steps to stop the illegal copying of software and to stop illegal copies being used once they have been sold.
- The following list shows a number of ways software is protected both by making the installer agree to certain conditions and also by methods which require the original software to be present for it to work:
  - When software is being installed, the user will be asked to key in a unique reference number or product key (a string of letters and numbers) which   was supplied with the original copy of the software (for example: 4a3c 0efa 65ab a81e).
  - The user will be asked to click 'OK' or 'I AGREE' or put a cross in a box to agree to the licence agreement before the software continues to install.
  - The original software packaging often comes with a sticker informing the purchaser that it is illegal to make copies of the software; the label is often in the form of a hologram indicating that this is a genuine copy
    - some software will only run if the CD-ROM, DVD-ROM or memory stick is actually in the drive; this stops illegal multiple use and network use of the software;
    - some software will only run if a dongle is plugged into one of the USB ports.
- The Federation Against Software Theft (FAST) was set up in the UK many years ago to protect the software industry against piracy …
- … FAST prosecutes organisations and individuals who are involved in any copyright infringements …
- … this is done by legal penalties for anyone found guilty of such infringement.

2 Benefits to both company and customer

- you can check it meets company/personal needs before buying it
- a level of product support that exceeds traditional software methods
- larger customer base which can be used to get help
- leads to bug fixes more quickly and benefits fed back to shareware purchasers
- less money spent on advertising, packaging and marketing therefore tend to pass on these benefits to customers.

Activity 7D

1   The answer could cover some of the following (or other) points

- where and when farmers should plant and harvest their crops; leading to maximising yield
- water resource management
- more accurate climate information
- cross-referencing genetics, habits and medical records can lead to early spotting of cancers
- ability to analyse masses of data quickly would lead to massive increase in the accuracy of data
- AI systems developed by what is known as *training data*: the AI system is trained to recognise certain aspects therefore they could learn to check the over-policing of minority groups or discrimination of certain people when asking for a loan (many other examples exist)
- carry out fair assessment of data since AI used to help decide on loan applications, insurance claims and job applications.

2   The following is just part of a long list of possible uses

- spam filters
- smart email categorisation
- smart personal assistants (such as Siri, Amazon Alexa or Google Now)
- online customer support systems (for example, Cogito which is a behavioural adaptive system designed to improve customer support)
- security surveillance systems
- product recommendations and purchase predictions (for example, Pandora smart music recommendation system or Amazon product prediction systems)
- predictive customer service
- Netflix (this company uses accurate predictive technology based on customer reactions to films and tv series being screened).

The following is a generic list of benefits and drawbacks which should be matched up to AI applications chosen (bearing in mind there are many others you can choose from)

Benefits	Drawbacks
reduces errors allowing higher degrees of data accuracy	can be expensive to repair and maintain some of the AI technology
automated reasoning and learning and perception (when using Siri, for example) will help with daily chores and life	cannot replicate human intuitive abilities and lack a degree of creativity
ability to do rational thinking with complete absence of any emotion	don't have emotions and therefore cannot make decisions about whether something is morally right or wrong
repetitive multi-tasking means jobs are done faster without error	cannot change their responses to a changing environment

End of chapter questions

1 a, b   **Ethics** governs professional interactions.

Legal covers the law; whether an action is punishable by law.

Essentially, anything which breaks the law is termed illegal. Examples from computer science would include copying software and then selling it without the permission of the copyright holders.

Unethical behaviour is essentially breaking a code of conduct. For example, if somebody works for a software company and passes on some of the ideas to a rival company, this would be regarded as unethical behaviour. Unless the software passed on is part of national security, then it isn't actually illegal to do this.

c i)

- 'assist colleagues in their professional development' – Nicolae was given little or no help in this area.

- 'takes responsibility for detecting, correcting and reporting errors in software' – since the programming language was outside Nicolae's knowledge he wasn't comfortable overseeing the project.

- 'ensures an appropriate method is used for any project on which they work' – Nicolae had no previous experience on which to judge this.

(The above 3 are one of many you may choose as long as you can tie his three issues to the task described.)

(ii)   7.02

6.08

3.05

(The above 3 are one of many you may choose as long as you can tie his three issues to the task described.)

2 a, b, c

Commercial software

- Commercial software is available to customers for a fee …

- … the fees paid either allow one genuine copy to be used on a single device or involves a licence being bought to allow multiple users.

- Occasionally, software is offered free of charge if an earlier version was bought by the user …

- … this type of software is fully copyright-protected and none of the code can be used without the prior consent of the copyright owner …

- … to ignore this is to break the law.

Free software and open source initiative

- The open source initiative allows users to use source code from published software free of charge …

- … it is very similar to free software …

- … with both types of software, users have the freedom to run, copy, change or adapt this software.

- The originators of this type of software stress this is based on **liberty** and **not price** …

- … this means that a user is guaranteed the freedom to study and modify the software source code in any way to suit their requirements.

- Essentially a user is allowed to do the following

- run the software for any legal purpose they wish
- study the software source code and modify it where necessary to meet their needs
- the software (in either original or modified form) can be passed on to friends, family or colleagues.
- A user of the software doesn't need to seek permission to do any of the above actions since it isn't protected by any copyright restrictions …
- … however, it is important that:
  - the user cannot add source code from another piece of software unless this is also described as free software
  - the user cannot produce software which copies existing software subject to copyright laws
  - the user cannot adapt the software in such a way that it infringes copyright laws protecting other software
  - the user may not use the source code to produce software which is deemed offensive by third parties.

Freeware:

- Freeware is software a user can download from the internet free of charge …
- … once it has been downloaded, there are no fees associated with using the software …
- … unlike, free software, freeware is subject to copyright laws and users are often requested to tick a box to say they understand and agree to the terms and conditions governing the software …
- which basically means that a user is not allowed to study or modify the source code in any way.

Shareware:

- Shareware allows users to try out some software free of charge for a trial period …
- … at the end of the trial period, the author of the software will request that you pay a fee if you like it …
- once the fee is paid, a user is registered with the originator of the software and free updates and help are then provided …
- … very often, the trial version of the software is missing some of the features found in the full version, and these don't become available until the fee is paid.
- Obviously, this type of software is fully protected by copyright laws and a user must make sure they don't use the source code in any of their own software.
- Permission needs to be obtained before this software is copied and given to friends, family or colleagues.

3 **a** fifth (E)

    b heuristics (C)

    c making a machine behave in an intelligent way (D)

    d iteration (E)

4   a, b