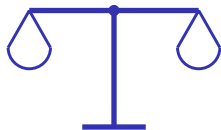


Ethics & Ownership

AS Computer Science ■ Topic 7

A-Level Computer Science



What we will cover

- 1 Ethics, copyright and licences 7.1
- 2 Professional bodies, licence choice, AI 7.1.1
- 3 Recap



1

Ethics, copyright and licences

Sheet 7.1 – what you need to know

You must be able to:

- explain professional ethics and a code of conduct
- describe copyright, licences, open source and shareware
- judge whether an action is ethical, with a reason

What the exam asks

“Complete the table by describing each term. Copyright / Open Source (Initiative) / Shareware / Software Licence” [4]

“Describe the purpose of a code of conduct.” [2]

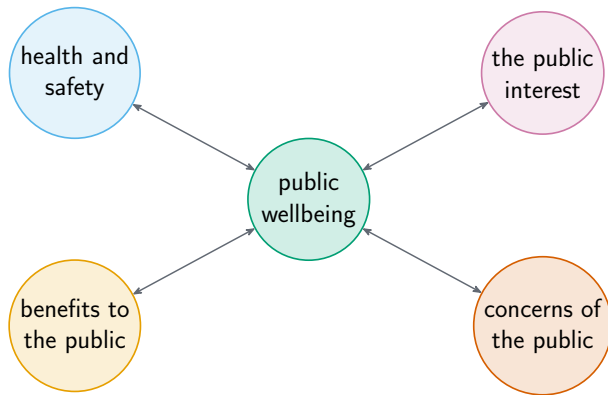
“Explain the reasons why it is important for the programmer to join a professional ethical body.” [3]

Practise on exercise sheet 7.1, then try the real exam questions on past-paper sheet 7.1.

Why ethics matters

A **computing professional** 计算机专业人员 builds software, systems, networks and data that affect people who **cannot judge the work themselves**. So the profession shares a code of **ethics** 伦理 – BCS, ACM and IEEE each publish one:

- **trust** – users rely on professionals
- **impact** – software runs medical, banking, vehicles



Principles in practice

- **public interest** first – safety, health, the environment
- **honesty and competence**: be honest about your skills, never claim expertise you lack
- **confidentiality** 保密性 – protect a client's or employer's private information
- avoid **conflicts of interest** 利益冲突
- respect **intellectual property** 知识产权 & **privacy** 隐私

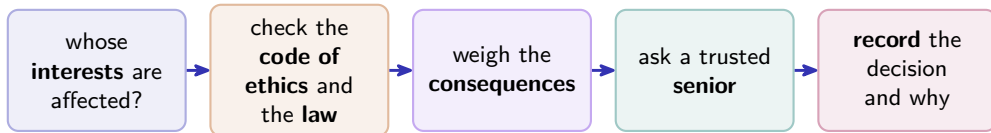
Biased AI hiring tool

It sorts CVs fast but rejects more older applicants. **Hold it back** until the bias is fixed – fairness before convenience.

Acting ethically vs unethically

Acting **ethically** protects users, reputation and trust; acting **unethically** (skipping testing, hiding bugs, misusing data) harms users and can mean dismissal or legal action.

On a borderline call:



Your call: ethical or not?

a serious bug is found just before release; the manager says “ship it anyway” – you stay silent

 public safety & interest come first

you reuse a well-tested open-source library, keep its licence and credit the authors

 intellectual property respected

a client's private data would make a great demo – you show it at a conference

 confidentiality broken

In an exam answer: **name the principle**, then apply it to the scenario. Discarded electronics (**e-waste**) are a growing environmental cost of computing.

Codes of conduct and professional bodies

“Describe the purpose of a code of conduct.” [2]

Rules and standards members agree to follow, so they act **ethically** and **professionally** and the public can trust them.

“Explain why it is important for the programmer to join a professional ethical body.” [3]

Shows employers they are **qualified** and follow a code (BCS, IEEE); **guidance** on ethical problems; **training** to stay current; contact with other professionals.

**acting
ethically
towards**

means

colleagues

share knowledge; credit their work; be honest about problems

the public

protect safety and privacy; never mislead about what software does

the employer

keep information confidential; work within competence

Computing has an environmental cost



E-waste 电子垃圾 grows fastest of any waste stream: short replacement cycles, toxic metals, much of it exported. Data centres add the electricity on top.

Copyright and patents

- **copyright** 版权: automatic, ~70 yr – covers code, images, text
- **patent** 专利: must be filed, ~20 yr – covers inventions & algorithms
- without it anyone could copy software freely, the developer would not be paid, and plagiarism would be legal

copyright

automatic – no registration

lasts ~70 years after the creator's death (code, images, documents)

patent

must be filed

~20 years (inventions, new algorithms)

Software licences

software licence 软件许可证 a contract: you may use the software only on the owner's terms

type	cost	source	modify, share	example
commercial 专有	paid	hidden	no	Microsoft Office
open-source 开源	free	published	yes*	Linux, Firefox
freeware 免费软件	free	hidden	no	Adobe Reader
shareware 共享软件	trial , then pay	hidden	no	WinRAR

***permissive** (MIT): almost any use. **copyleft** 著佐权 (GPL): changes keep the same licence.

Describing the terms, and a device brought from home

term	description
copyright	the legal right of the creator to control copying, changing and distributing their work
Open Source Initiative	promotes software whose source code is published, to be studied, changed and shared
Free Software Foundation	insists on users' freedoms to run, study, change and share
shareware	free to try for a limited time or with limited features, then paid for
software licence	the terms on which software may be used

A student connects a personal laptop to the school network. Ethical?

Only with [permission](#): it may carry [malware](#), may bypass filters and monitoring, and uses bandwidth others need. Follow the school's acceptable-use policy.

2

Professional bodies,
licence choice, AI

Sheet 7.1.1 – what you need to know

You must be able to:

- choose a licence for a scenario and justify it
- describe how AI is used, for example to recognise people
- give social, economic and environmental impacts of AI

What the exam asks

“Describe what is meant by copyright.” [2]

“Explain how the new system uses AI to identify each customer.” [4]

“Identify one type of sensor that can be used in this new system...” [2]

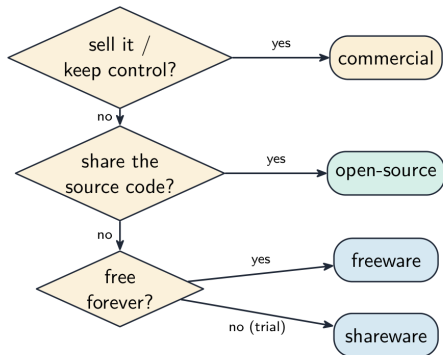
Practise on exercise sheet 7.1.1, then try the real exam questions on past-paper sheet 7.1.1.

Choosing a licence, and justifying the choice

proprietary	source withheld, use restricted – chosen for revenue and control
open-source	source published and modifiable – chosen when the developer wants it widely used and improved by the community
freeware	free to use, source withheld – chosen for reach, often to sell something else
shareware	free to try, then paid – chosen to let the product sell itself
how to justify	link the licence to the developer's goal (revenue, reach, community), the user's needs (cost, customising), and the use case

“Open-source is better” scores nothing. Name whose goal it serves and why that goal fits this scenario.

Choosing a licence for a scenario



A company sells an app and wants nobody to copy it.

Commercial: the source stays hidden and every user pays.

Users should try the app before paying.

Shareware: a free trial, then a fee.

A charity wants a tool improved by volunteers; it will charge for support.

Open source: the code is shared and improved; income comes from **maintenance**.

Artificial intelligence

AI 人工智能 does tasks once needing human intelligence.

Most uses **machine**

learning 机器学习 – learning patterns from data.

- understand:
speech 语音识别, **image recognition** 图像识别
- decide: translation, recommendations, self-driving



reading a foreign label aloud

OCR → translate → speak

What modern AI is, and where it appears

**machine
learning** 机器学习

algorithms that improve at a task by **learning patterns from large amounts of data**, rather than following rules written by hand

**neural
networks** 神经网络

layered models loosely inspired by neurons; **deep learning** 深度学习 means many such layers

OCR 光学字符识别

optical character recognition – reading printed or handwritten text

**text-to-
speech** 文字转语音

turns text into speech; speech recognition goes the other way

**autonomous
vehicles** 自动驾驶汽车

with robots, they combine vision, planning and control

The shift is from **rules written by a programmer** to **patterns learned from data**. Every benefit and every concern below follows from that one change.

Everyday examples

AI tasks split into two kinds – **understanding input**, and **producing output or decisions**.

- **speech recognition** 语音识别 – spoken words to text (voice assistants).
- **image recognition** 图像识别 – finding objects, faces or text in images.
- **machine translation** 机器翻译 – automatic translation between languages.
- **recommendation systems** 推荐系统 – suggesting products, videos or music.

How AI identifies a customer, and the impact answer

“Explain how the new system uses AI to identify each customer.” [4]

- 1 A camera **captures** the customer's face.
- 2 The system **extracts features**: distances between eyes, nose and mouth.
- 3 It **compares** them with stored data, using a model **trained** on many faces.
- 4 The closest match above a confidence level identifies the customer; each result helps it **learn**.

Shelf: a **weight** sensor; a drop in weight shows what was taken.

impact

example

social	less human contact; bias learnt from training data
economic	jobs lost in checkouts, new jobs in IT; lower costs
environmental	data centres use energy and water
ethical	privacy of faces; who is responsible for errors

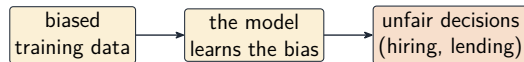
AI: benefits and concerns

Benefits:

- accessibility & productivity
- spots patterns in huge data

Concerns:

- **bias** 偏见, privacy, transparency
- accountability, misuse



biased data → biased model → unfair decisions

AI: the benefits and the concerns

speed and scale	processes far more data than people can, and does not tire
decision support	spots patterns in huge datasets – medical diagnosis, fraud detection
always available	and personalised to each user
job displacement	AI may replace some roles, and change many more
bias	a model trained on biased data reproduces that bias at scale
transparency and misuse	large models are “black boxes” hard to explain; and deepfakes, misinformation and surveillance are real uses

Answer in **pairs**: each benefit has a matching concern, and the exam marks the balance rather than the length of either list.

3

Recap

Exam tips

- Answer ethics questions against a **professional code of conduct** (public interest, competence, honesty), not personal opinion.
- Distinguish **copyright** (protects the expression) from a **patent** (protects an invention).
- Compare software licences: proprietary, open-source, freeware, shareware and FOSS.

Topic 7 – key takeaways

1

Ethics

public interest first; honesty;
confidentiality

2

Copyright

automatic; patents cover
inventions

3

Licences

commercial, open-source,
freeware, shareware

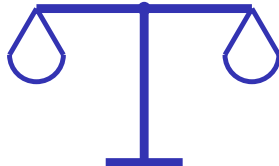
4

AI

learns from data; beware bias &
accountability

Check yourself

- 1 Does copyright need registration?
- 2 Which licence shares its source code?
- 3 What is “copyleft” (GPL)?
- 4 How does bias get into an AI system?



Answers 1. no (automatic) 2. open-source 3. modified versions stay open 4. from biased training data