Understanding Artificial Intelligence from Scratch

Student workbook: attempt every question before looking at the solutions manual.

O1	Explain in plain words what artificial intelligence and machine learning are.
O2	Describe how training data turns into a model that makes predictions.
O3	Understand, at a simple level, how generative AI creates text.
O4	Recognise what AI does well, where it fails, and how to use it responsibly.

O1: Explain in plain words what artificial intelligence and machine learning are.

Q01 [Foundational · short answer]

In plain words, what does an AI system do according to the OECD definition used in the lesson?

Q02 [Foundational · true/false]

True or false: all AI systems are robots.

Q03 [Foundational · multiple choice]

Machine learning is best described as: (a) writing every rule by hand (b) finding patterns in examples (c) building robots (d) storing files

Q04 [Core · conceptual]

Why did rule-based spam filters struggle?

Q05 [Core · classification]

Rule-based or learning? (a) a calculator adding numbers (b) a phone recognising your face (c) a tax form applying fixed rates

Q06 [Applied · explanation]

Give one task better solved with rules and one better solved with machine learning, and justify each.

O2: Describe how training data turns into a model that makes predictions.

Q07 [Foundational · short answer]

What is a label in machine learning?

Q08 [Foundational · multiple choice]

What do we call using a trained model to make a prediction on new data? (a) training (b) labelling (c) inference (d) overfitting

Q09 [Core · numerical]

Using the rule 'apple if redness >= 0.1 x weight - 13', classify a fruit of 210 g with redness 5.

Q10 [Core · numerical]

A model makes 50 predictions on test data and 42 are correct. What is its accuracy?

Q11 [Applied · conceptual]

Explain overfitting using the example of a student who memorises past exam answers.

Q12 [Applied · analysis]

Of 1,000 emails, 950 are genuine. A model labels every email 'genuine'. Calculate its accuracy and explain why it is still useless.

Q13 [Advanced · design]

You want to build a model that predicts whether a plant needs water. Name three features, the label, and how you would split the data for testing.

O3: Understand, at a simple level, how generative AI creates text.

Q14 [Foundational · short answer]

What simple task is a large language model trained to do?

Q15 [Foundational · true/false]

True or false: a language model looks up every fact in a trusted database before answering.

Q16 [Core · numerical]

Next-word probabilities are: tea 0.5, coffee 0.3, juice 0.15, soup x. Find x.

Q17 [Core · multiple choice]

What is a 'hallucination' in generative AI? (a) a picture of a dream (b) a confident but false output (c) a type of neural network (d) a training dataset

Q18 [Applied · explanation]

Explain, step by step, how a chatbot produces a sentence of reply.

Q19 [Advanced · analysis]

Why can a language model write fluent text about a topic yet still make factual mistakes about it?

O4: Recognise what AI does well, where it fails, and how to use it responsibly.

Q20 [Foundational · short answer]

Name two things AI does well.

Q21 [Foundational · multiple choice]

Which should you NOT paste into a public AI tool? (a) a recipe question (b) your bank password (c) a request to explain photosynthesis (d) a poem prompt

Q22 [Core · explanation]

How can bias get into an AI system?

Q23 [Core · true/false]

True or false: AI tools used in hospitals should make final diagnoses without a doctor.

Q24 [Applied · application]

A chatbot gives you a statistic for an essay. Describe how you would use it responsibly.

Q25 [Advanced · evaluation]

A company plans to use AI to screen job applications automatically. List three risks and one safeguard for each.

Assignment 1: AI in my day (individual, about 500 words)

Keep a one-day diary of every AI system you use or meet (phone, apps, websites, shops, transport).

1. For three of them, describe the input, the output and what the system probably learned from (O1, O2).
2. For one, explain how you would test whether it works well (O2).

3. Identify one risk and one sensible safeguard for each of the three (O4).

Assignment 2: check the chatbot (pairs)

Ask a chatbot five factual questions in a subject you study. Check every answer against a reliable source.

1. Record which answers were fully correct, partly correct or wrong (O3, O4).
2. Calculate the accuracy (O2).
3. Explain why errors may have happened, using next-token prediction (O3).