



Computer science
Higher level
Paper 3

5 May 2025

Zone A morning | Zone B morning | Zone C morning

1 hour

Instructions to candidates

- Do not turn over this examination paper until instructed to do so.
- A clean copy of the **computer science case study** is required for this examination paper.
- Read the case study carefully.
- Answer all questions.
- The maximum mark for this examination paper is **[30 marks]**.

Answer **all** questions.

1. (a) Define the term *large language model (LLM)*. [2]
(b) Outline **one** advantage of pre-processing input data for a machine learning model. [2]
 2. (a) Outline **two** advantages of using a tensor processing unit (TPU). [4]
(b) Outline **two** processes that would help a chatbot generate a more personalized response to a customer query. [4]
 3. Data privacy and data security are major ethical challenges.

Discuss the advantages **and** disadvantages of replacing real data with synthetic data for training *RAKT's* insurance chatbot. [6]
 4. Deep learning models are used for natural language processing. A significant challenge is achieving a standard where the responses given by a machine are indistinguishable from that of a human.

Two types of deep learning model are used for natural language processing: a recurrent neural network (RNN) and a transformer neural network (transformer NN).

Evaluate these two deep learning models for natural language processing. [12]
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