الاسم: .... رقم التسجيل: ....

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Instructions: Time **50** min. Open book and notes exam. No electronics. Please answer all problems in the space provided and limit your answer to the space provided. There are six problems, and each problem has 5 points.

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P1. The following abstract is from a famous research paper. In the space provided below, formulate the research problem of the corresponding research by identifying the topic, main research question, and research significance.

> *We introduce a new language representation model called BERT, which stands for Bidirectional Encoder Representations from Transformers. Unlike recent language representation models, BERT is designed to pre-train deep bidirectional representations from unlabeled text by jointly conditioning on both left and right context in all layers. As a result, the pre-trained BERT model can be fine-tuned with just one additional output layer to create state-of-the-art models for a wide range of tasks, such as question answering and language inference, without substantial task-specific architecture modifications.*

1. **Topic: Deep learning techniques for language representation**

2. **Question: How to efficiently create deep models from unlabeled text for general language representation?**

3. **Significance: Create models that can accurately solve wide range of tasks without substantial task-specific architecture modifications.**

P2. Convert the following citation and reference from the APA style to IEEE Conference style.

Another example: Karar et al. (2020) provided the bacterial classifier models.

Karar, M., Hemdan, E., & Shouman, M., 2020. Cascaded deep learning classifiers for computer-aided diagnosis of COVID-19. Complex & Intelligent Systems, 7(1), 235–247.

Another example: Karar *et al*. [1] provided the bacterial classifier models.

[1] M. Karar, E. Hemdan, and M. Shouman, "Cascaded deep learning classifiers for computer-aided diagnosis of COVID-19," Complex & Intelligent Systems, vol. 7, no. 1, pp. 235–247, 2020.

P3. Given the evidence in the following table for classifying Arabic poems, provide research claim, reason, and warrant related to this evidence.

Table 12
Classification results of related work and our system.

System	Model parameters	Dataset size	Classes	Accuracy
Expert system (Ismail et al., 2010)	Not applicable	20 poems	8 poetry	100%
Context free grammar (Alnagdawi et al., 2013)	Not applicable	128 verses	16 poetry	75%
Rule-based algorithm (Abuata and Al-Omari, 2018)	Not applicable	417 verses	16 poetry	82.2%
7-BiLSTM (Yousef et al., 2019)	401 k	1,722,321 verses	16 poetry	94.11%
5-BiGRU (Al-shaibani et al., 2020)	5600 k	55,440 verses	14 poetry	94.32%
This work (4-BiLSTM)	**350 k**	**1,657,003 verses**	**16 poetry + prose**	**97.27%(100% for long poems)**

Claim: The proposed 4-BiLSTM model is better than the solutions of previous work in classifying Arabic poetry.

Reason: Because it can classify more classes and provide higher classification accuracy.

Warrant: Machine learning models that can classify Arabic poems into more classes more accurately are better than models that identify fewer classes with lower accuracy.

P4. The execution times in milliseconds of multiplying 200 by 200 matrices on three systems are: 500 on i3, 450 on i5, and 400 on i7. The following chart presents this data. Redraw this chart according to the guidelines you have learned in this course.
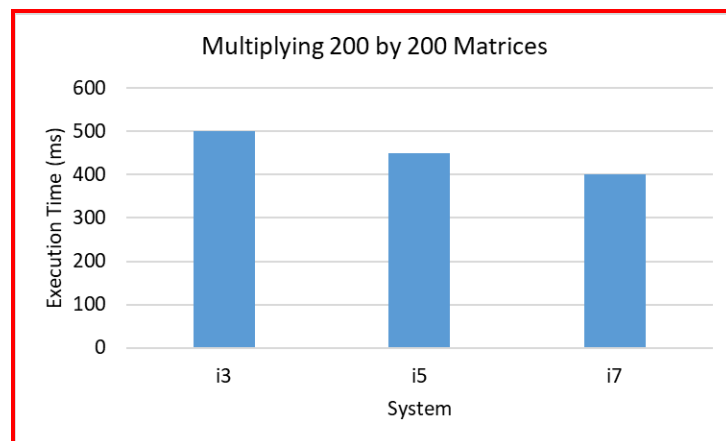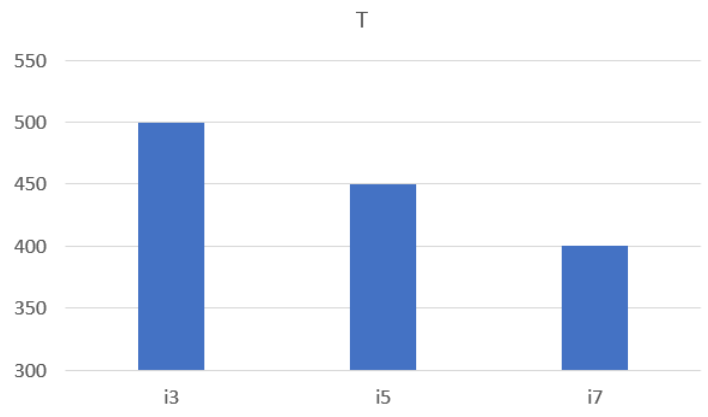
P5. How do you advise a junior researcher (encourage, discourage) referring to you about the following actions?

Action	Encourage/Discourage
1. Spend a time longer than the planned time to improve the cost-effectiveness of the proposed solution.	**Encourage**
2. Strongly attack a researcher who I think has a wrong explanation of an important problem.	**Discourage**
3. Paraphrase the description from an old research paper of a procedure that I use without specifying its source.	**Discourage**
4. Report some secondary data that I have found and is not in line with the main thesis claim.	**Encourage**
5. Use evidence of unknown source to support my main claim.	**Discourage**

P6. Assume that you want to evaluate a new multi-core design that uses new chip interconnection network and new cache coherence protocol for shared-memory applications. Among the three main evaluation techniques, which one do you use? State your assumptions and justification for the selection you make.

Assuming that I don't have the system to perform measurements, I would use simulation because such detailed design options cannot be accurately evaluated using analytical modeling.

<Good Luck>