

EE Ph.D. Qualifying Exam, January 2009 Question

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Computing without dissipation?

Notes:

There may not be a single “correct” answer to this question. The goal of this question is to see how you think about it.

If you finish the question on this sheet, subsequent questions will be asked.

[Examinees were also told verbally that the examiner was most interested in the way they thought rather than being concerned with right or wrong answers or statements, and that the exam would be conducted primarily by talking between the examinee and the examiner.]

Question:

Is it fundamentally possible to make a computer that dissipates no power while still performing a useful calculation?

If so, explain how to make the computer.

If not, explain why this cannot be done.