True or False (9.5 pts / problem)

1. (X) In 1998, mini-computers gradually disappeared, which is caused by the fact that supercomputers arise and their super powerful computing capability makes mini-computers useless and not cost-effective.

2. (X) Two representative design techniques to show the technical level of a country in the semiconductor area are the techniques of CPU design and AI-chiip design. *Memory*

3. (O) Consider the CMOS technology in IC design, the power consumption of an IC increases as its working frequency increases, which limits the increase of working frequency of an IC.

4. (O) Two designs of the same functionality have different die sizes. The chip with larger die size has lower yield and then the higher cost for manufacturing to produce the same number of chips for sale.

5. (O) Alice used to run a program or use a tool at a time. Next program or tool will be run after current program or tool ends. For this kind of use model, a new computer running at higher clock rate is more suited to Alice than another new computer with more CPU cores running at the same clock rate in terms of response time.

6. (X) Elapse time is the time spent in processing a job, ~~not~~ including the time for IO and OS overhead and idle time.

7. (X) When a CPU runs with 100% loading, its power consumption is also the highest. On the contrary, as a CPU keeps idle with 0% loading, it has no power consumption.

8. (X) MIPS (million instructions per second) metric is a fair metric to evaluate the CPU performance since more executed instructions per second imply higher CPU performance.

9. (O) A CPU with a divider and an adder runs a program with 10 minutes. In this program, division operations require 8 minutes while 2 minutes are for addition operations. It is possible to reduce the runtime of this program to 1 minute if we re-design the divider and adder.

10. (O) If we use clock rate and CPI to compare the performances of two CPUs, the potential issue is we ignore the differences between two ISAs and their instruction complexity.

11. (O) AI accelerator design has a severe challenge to face with the demand of high memory bandwidth.