Q-2

Due Sep 2 at 11:59pm **Points** 100 **Questions** 5
Available Sep 1 at 12pm - Sep 2 at 11:59pm 1 day **Time Limit** 20 Minutes

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	20 minutes	20 out of 100 *

* Some questions not yet graded

Score for this quiz: **20** out of 100 *
Submitted Sep 2 at 2pm
This attempt took 20 minutes.

Question 1

Not yet graded / 20 pts

Describe the three elements for measuring CPU time.

Your Answer:
The three elements for measuring CPU time are:
(1)Instruction count, which is how many instructions are in a program.
(2)Cycles per instruction, which is how many cycles each instruction takes.
(3)Clock cycle time, which is how many seconds per clock cycle.

Instruction count (IC), average cycles per instruction (CPI), and the clock cycle time.

Question 2

Not yet graded / 20 pts

Concisely explain what temporal and spatial localities are.

Your Answer:

Temporal Locality = When something is recently accessed by a program it is likely to be accessed again. An example would be a loop variable, because its accessed again and again.

Spatial Locality = This refers to the fact that when something is accessed by a program, things near that in memory are likely to be accessed. For instance accessing array elements in sequence. Your program will access values close to each other in memory.

Those localties are properties of programs.
Temporal locality refers to the property where a memory location, if accessed, is likely to be accessed again in the near future. Spatial locality refers to the property where if a memory location is accessed, it is likely the the neighboring locations will be accessed in the near future.

Question 3

Not yet graded / 20 pts

Use one or two sentences to concisely describe the main motivation for memory hierarchy.

Your Answer:

The main motivation of memory hierarchy is that we have smaller and faster memory spaces closer to the CPU for faster access time. We will look there for the needed data before we take the time to go to main memory. Due to the principal of locality we know that things accessed recently are likely to be accessed again, so we bring things to a higher memory location so they can be accessed faster in the future.

Build a memory system with a speed that is close to that of SRAM, but with a capacity and cost close to those of the hard disk.

And/or

To improve average memory access speed and reduce energy consumption by exploiting localities in programs.

Question 4

20 / 20 pts

Which of the following cache block will the block number 10 from main memory go to? Suppose the cache is direct mapped with 8 blocks.

- Anywhere
- 2 (Correct!)
- 8
- 10

Question 5

Not yet graded / 20 pts

Suppose the memory address is 32 bits wide, and the memory is byte addressable. The cache block size is 64 bytes, and the cache has 64 blocks. Show the ranges of bits of the memory address that are used for tag, index,

and block offset.

Your Answer:

Index = 2^6 = 64 so we need 6 bits for index = 6-11

offset = 2^6 = 64 so we need 6 bits for offset = 0-5

The remaining bits will be used for the tag, which is 20 bits. 12-31 would be used for the tag.

tag: bits 31-12,

index: bits 11-6,

block offset: 5-0

Quiz Score: **20** out of 100