1. How many bytes worth of registers does a Pentium4 CPU have?

2. Name a difference between L1 cache and L2 cache.

3. What is a cache line?

4. Why do most contemporary computers have cache?

5. What is a cache hit?

6. What is a cache miss?

7. For each of these cache associativity schemes, a byte of RAM can go into how many different locations in cache?
   (a) direct mapped
   (b) fully associative
   (c) 2-way set associative
   (d) 8-way set associative

8. What is a cache conflict?

9. For each of these cache associativity schemes, what happens in the event of a cache conflict?
   (a) direct mapped
   (b) fully associative
   (c) $N$-way set associative (for any given $N$)
10. For each of these cache associativity schemes, are they popular? Why or why not?
   (a) direct mapped
   (b) fully associative
   (c) \( N \)-way set associative (for any given \( N \))

11. Name two cache replacement strategies.
   (a)
   (b)
   (c)

12. If a variable is in cache, is it also in RAM? Explain.

13. What does it mean for a cache line to be dirty?

14. What is the difference between write-through and write-back?

15. What is temporal data locality?

16. What is spatial data locality?

17. Typically, what happens to performance if a code exhibits little or no locality?

18. What is tiling?

19. Why does tiling sometimes improve performance?

20. Why is hard disk slower than RAM?

21. Why should your hard disk I/O use binary representations rather than human-readable text?

22. Name an advantage of using a portable I/O library such as HDF or NetCDF, compared to outputting either native binary or text.