Memory Review Chapter 8 & 9

8.1, 8.2, 8.3, 8.5, 8.24,
9.1, 9.3

1. Why is it beneficial for the CPU to have an L1 data cache? What property of data access best takes advantage of the L1 data cache?

2. What is meant by address bind time?

3. When is the address of pthread_create() bound in your CS460_Life executable? Justify your answer.

4. How could you change the bind time of pthread_create() in the above question?

5. How are logical addresses and physical addresses different? What entity uses each type of address? How are the two types of addresses related?

6. What hardware support is available to translate between the two address types in 5?

7. Why might you need to swap out memory to disk? What are the disadvantages of swapping to disk?

8. Sometimes data is swapped back in at a different address than it was previously located. Are we talking about physical or logical addresses here? Why does this work?

9. What is the difference between a page and a frame?

10. How are pages and frames related? What entity uses each?

11. The following code outputs: 0x55a86d0a8230.

```
fprintf(stderr, "%p\n", apBigMemory);
```

    1. Is that address a logical or physical address?
    2. Can you guess the page number if you know the page size is 4096 (0x1000) bytes?
    3. Can you guess the frame number if you know the frame size is also 4096 (0x1000) bytes?
    4. Do you think that address is on the heap or the stack?

12. The page table is typically kept in memory. What issues can arise from this fact?

13. What is the job of the Translation Look-aside buffer (TLB)?

14. Why does paging allow you to more easily share memory between processes?

15. Describe the problem the inverted page table is trying to solve. How does the inverted page table solve this problem?

16. With Virtual Memory, you can page out only part of a process's memory. Why is this useful?

17. What is Demand Paging? Why is it often called Lazy Loading?

18. What is a Page Fault? How is this different from a SegFault?

19. What is Copy-On-Write? Why might fork() want to use Copy-On-Write to create a new process? Which section of the ELF file will produce more benefit by using Copy-On-Write with fork()?

20. What is Thrashing? What problems does this cause? What may cause Thrashing?