Practice Problems for the midterm exam 2

- Explain the four classes of exceptions.
- What comprises a process context?
- Suppose that two processes are running concurrently on a processor. Describe the context switches that may be involved when a process is trying to read a file and when the file data is ready.
- What is a zombie process and how to reap a zombie process?
- I may ask you to write a program using some of the system call APIs below
    - fork, execve, exit, waitpid, getpid, getppid, pause, sleep, kill, signal
- Why do we need to save/restore the errno variable in the signal handler?
- Explain the volatile keyword.
- Explain the file operations below
    - open, seek, read, write, close
    - I may ask you to write a program using some of the system call APIs below
        - open, read, write, close, opendir, readdir, closedir, dup2, pipe
    - Explain the descriptor table, file table, and v-node table
        - What is the information stored in these tables?
    - How to share files between processes?
        - What will be read after a combination of fork/open/read/write/dup2?
    - I may ask you to write a program that implements I/O redirections
- What information is stored in each thread's own context?
- What information is shared between threads?
- I may ask you to write a program using some of the APIs below
    - pthread_create, pthread_exit, pthread_join, sem_init, sem_post, sem_wait
- What are semaphores and how to use them?
    - How to use binary semaphores?
    - How to use counting semaphores?
    - Implement a part of the producer-consumer problem.
    - Implement a part of the reader-writer problem.
- Issues about multi-threading (overhead, safety, race, deadlock)
    - I may show you a program and ask you to find issues and fix them
    - What are race conditions in multi-threading?
    - What are reentrant functions?
    - What are deadlocks?
        - Explain the four deadlock conditions
        - Explain a way to fix a deadlock problem