

## Worksheet 4.1: Multiple-Choice Questions

In the questions below, circle the right answer. There is only one correct answer

1. Which of the following is (are) true about threads?
  - a. Threads within the same process must be run on the same CPU.
  - b. Threads within the same process share global variables.**
  - c. Threads within the same process share the same stack.
  - d. Parallel programming using threads can utilize more cores than parallel prog. using processes.
  - e. Both b and c are correct.
  - f. Both b and d are correct.
  - g. Both a and c are correct
2. Which of the following is true about threads and processes?
  - a. Context switching between threads is faster than context switching between processes.
  - b. Threads within the same process share global variables, but different processes can't share global variables.
  - c. A thread generally uses more resources than a process does.
  - d. A multi-core system can be utilized using multiple threads but can't be utilized using multiple processes.
  - e. **Both a and b are correct.**
  - f. Both a and d are correct
  - g. a, b and d are correct.
3. What is (are) the advantage(s) of dividing an application into multiple threads relative to dividing it into multiple processes?
  - a. Utilizing a multi-core system
  - b. One slow task won't slow the whole application
  - c. Using less resources
  - d. Easier communication using global variables
  - e. Both a and c are correct
  - f. Both c and d are correct**
  - g. Both b and d are correct
4. What are the limitations of Amdahl's Law?
  - a. It assumes that the parallelizable code can be divided *equally* among the CPUs.
  - b. You cannot apply it to a system with more than 10 CPUs.
  - c. It does not account for the communication or synchronization overhead.
  - d. You can apply it only when all CPUs are on the same chip not on different chips.
  - e. Both a and b are correct.
  - f. Both a and c are correct.**
  - g. Both a and d are correct.
5. In a given program, one fifth of the code is parallelizable. What's the maximum speedup factor that can be achieved on a quad-core processor under ideal conditions?
  - a. 4
  - b. 20/17**
  - c. 20
  - d. 2.5
  - e. 5
  - f. 5/4
  - g. 1/4

Speedup =  $1 / ((1/5)/4 + 4/5) = 1 / (1/20 + 16/20) = 20/17$
6. Which of the following is (are) true about concurrency and parallelism?
  - a. With concurrency, only one process may be *running* at a given point in time, while with parallelism multiple processes may be *running* simultaneously.**
  - b. With concurrency, the total time needed to execute a given set of long CPU bursts from different processes is always less than the time needed to execute the processes sequentially.
  - c. Parallelism is achieved using multithreading, while concurrency is achieved using multiprocessing.
  - d. Concurrency requires multiple CPUs, while parallelism may be achieved on a single CPU.
  - e. Both a and d are correct.
  - f. Both a and c are correct.
  - g. a, c and d are correct.