CEG 4136 Tutorial 2

QUESTION #1

Consider a multiprocessor system with two processors (P1 and P2) and each processor has a cache. Initially, there is no copy of variable X in any of the caches and X=10. Draw the write through – write invalidate coherence protocol state diagram and show the state of variable X in caches and memory after each of the preceding statements is executed.

	State of P1's Cache	Content of X in P1's Cache	State of P2's Cache	Content of X in P2's Cache	Content of memory location X
1. Processor P1 reads Variable X					
2. P2 reads X					
3. P2 performs operation X=X+2					
4. P1 performs operation X=X*2					
5. P2 reads X					

QUESTION #2

The following MPI program is given. What is the order of printing? Why?

```
#include <stdio.h>
#include "mpi.h"
main(int argc, char** argv)
{
        int my_PE_num;
        MPI_Init(&argc, &argv);
        MPI_Comm_rank(MPI_COMM_WORLD, &my_PE_num);
        printf("Hello from %d.\n", my_PE_num);
        MPI_Finalize();
}
```

MPI_Init : initiate computation
MPI_Comm_rank : determine the integer identifier assigned to the current process (processes in a process group are identified with unique, contiguous integers numbered from 0)
MPI_COMM_WORLD : default value which identifies all processes involved in a computation
MPI_Finalize : terminate computation

QUESTION #3

For programs with each of the following sets of characteristics, would a shared-memory multiprocessor or a message-passing multiprocessor be a better choice, all other factors being the same?

a) Values tend to be computed well before they are used.

b) The control structure is very complicated, making it difficult to predict which data will be needed by each processor.