1) Evaluate speedup and efficiency for the following choices of parameters and indicate what is the main factor limiting speedup for each. Assume the linear communication model.
   a) \( A=0.001, r_1=5000, d =1000, n=1000 \)
   b) \( A=0.001, r_1=5000, d =20, n=100 \)
   c) \( A=0.05, r_1=5000, d =500, n=500 \)

2) Text problem 5.3 (replace write-allocate by write-no-allocate in problem statement)

3) Consider a 4-processor shared-memory MIMD system with private caches at each processor. Assume the caches are initially empty and \( X \) starts with the value 23. For:
   a) a bus-based system with write-back caches and MSI protocol, and
   b) a bus-based system with write-back caches and Dragon protocol

and for the following sequence of operations:

\[
\begin{align*}
&P_3 \text{ reads } X \\
&P_3 \text{ writes } X = -5 \\
&P_3 \text{ writes } X = 12 \\
&P_1 \text{ reads } X \\
&P_2 \text{ reads } X \\
&P_2 \text{ writes } X = 7 \\
&P_4 \text{ writes } X = -3 \\
&P_1 \text{ reads } X
\end{align*}
\]

show at each step the value of \( X \) in each cache, the state of \( X \)'s cache block in each cache, and the value of \( X \) in main memory.

4) Text problem 5.17

5) Text problem 8.3