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Question 1

|  |  |  |  |
| --- | --- | --- | --- |
| Statement | Read | Write | Dependency |
| S1: | a | a |  |
| S2: | a, b | b | S1δfS2 |
| S3: | a, d | c | S1δfS3 |
| S4: | c | d | S3δfS4, S3δaS4 |
| S5: | a | a | S1δOS5 , S1δfS5, S1δaS5, S2δaS5, S3δaS5 |

Question 2

A[i][j] is written in statement 1 and is read in statement 2, hence there is a flow dependency from S1δfS2

|  |  |  |  |
| --- | --- | --- | --- |
| Body | Distance vector | Direction Vector | Dependency Type |
| S1 | (-1, 1) | (-, +) | Anti |
| S2 | NA | NA | NA |

There is also a flow dependency from S1 to S2 as S1 is writing A[i][j] and S2 is reading from it.

If we change the ordering of loops i and j then the sign of direction vector would change for S1, but it won’t make any difference to S2. Hence we cannot do re-ordering of loops because it will change direction vector of S1.

Question 3

|  |  |  |  |
| --- | --- | --- | --- |
| Body | Distance Vector | Direction Vector | Possible Re-ordering |
| (a.) | NA | NA | All 4! Re-ordering of (I, J, K, M) is possible as there is no conflict for any of the memory location |
| (b.) | (1, 0, 0, 0) | (+, 0, 0, 0) | All 4! Re-ordering of (I, J, K, M) is possible as the direction vector will always be positive for any order of (I, J, K, L) |
| (c.) | (0, 0, 0, 1) | (0, 0, 0, +) | All 4! Re-ordering of (I, J, K, M) is possible as the direction vector will always be positive for any order of (I, J, K, L) |