CSE 5441
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Question 1

Statement	Read	Write	Dependency
S1:	a	a	
S2:	a, b	b	$S1\delta^{f}S2$
S3:	a, d	c	$S1\delta^{f}S3$
S4:	c	d	$S3\delta^{f}S4$, $S3\delta^{a}S4$
S5:	a	a	$S1\delta^{O}S5$, $S1\delta^{f}S5$, $S1\delta^{a}S5$, $S2\delta^{a}S5$, $S3\delta^{a}S5$

Question 2

A[i][j] is written in statement 1 and is read in statement 2, hence there is a flow dependency from $S1\delta^{f}S2$

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)