

3.

Body

distance vector

direction vector

$$a) A[i, j, k, m] = B[i-1, j-1, k-1, m-1] \quad ---$$

$$b) A[i, j, k, m] = A[i-1, j, k, m] \quad (1, 0, 0, 0)$$

$$c) A[i, j, k, m+1] = A[i, j, k+1, m] + B[i] \quad (0, 0, -1, 1)$$

 $(+, 0, 0, 0)$ $(0, 0, -, +)$

a) no dependencies, fully re-orderable.

b) flow dependence, fully re-orderable

c) anti-dependence, partially re-orderable

valid:

$$MIJK, MJIK \quad (+, 0, 0, -)$$

$$MIKJ, MJKI \quad (+, 0, -, 0)$$

$$MKIJ, MKJI \quad (+, -, 0, 0)$$

$$IMJK, JMJK \quad (0, +, 0, -)$$

$$IMKJ, JMKI \quad (0, +, -, 0)$$

$$IJMK, JIMK \quad (0, 0, +, -)$$