homework 4 - dependence analysis

due date: Wed., 9/27

1. **[10 pts.]** Describe all data dependencies in the following code segment:

```
S1:  a++
S2:  b = a + b
S3:  c = a + d
S4:  d = c^2
S5:  a - -
```

2. **[10 pts.]** What are the data dependencies, distance vectors and direction vectors for S1 and S2 in the following code segment?

```
     for ( i = 0; i < MAX; i++ )
        for ( j = 0; j < MAX; j++ )
S1:        A[ i ][ j ] = A[ i+1 ][ j-1 ]
S2:        B[ i ][ j ] = A[ i ][ j ]
```

Can these loops be re-ordered? Why or why not?

3. Given the following loop nest, for each value of BODY, which loop re-orderings are valid?

```
for ( i = 0; i < MAX; i++ )
   for ( j = 0; j < MAX; j++ )
      for ( k = 0; k < MAX; k++ )
         for ( m = 0; m < MAX; m++ )
            BODY( i, j, k, m)
```

	BODY
(a.) **[10 pts.]**	A[i, j, k, m] = B[i-1, j-1, k-1, m-1]
(b.) **[10 pts.]**	A[i, j, k, m] = A[i-1, j, k, m]
(c.) **[10 pts.]**	A[i, j, k, m+1] = A[i, j, k, m] + B[i]