198:515 Programming Languages and Compilers I

Problem Set 5

This homework will not be graded. A sample solution will be made available at a later time.

Problem 2 - Dependence Analysis

Give the direction vectors, and if possible the distance vectors for all dependences in the following loop nests. State explicitly whether a dependence is a true, anti, output, or input dependence.

1.
```
do i = 3, 100
  a(i) = a (i-1) + a(i+1) + a(i-2)
enddo
```

source reference	sink reference	type	distance vector	direction vector
a(i)	a(i-1)	true	(1)	(<)
a(i)	a(i-2)	true	(2)	(<)
a(i+1)	a(i)	anti	(1)	(<)
a(i+1)	a(i-1)	input	(2)	(<)
a(i+1)	a(i-2)	input	(3)	(<)
a(i-1)	a(i-2)	input	(1)	(<)

2.
```
do i = 1, 100
  a(2*i) = a(2*i-1) + a(2*i+1)
enddo
```

source reference	sink reference	type	distance vector	direction vector
a(2*i+1)	a(2*i-1)	input	(1)	(<)

3.
```
do i = 1, 10
  aL(i) = a(5) + aR(i)
enddo
```

source reference	sink reference	type	distance vector	direction vector
a_L(i)	a(5)	true	-	(<)
a(5)	a_L(i)	anti	-	(<)
a(5)	a_R(i)	input	-	(<)
a_R(i)	a(5)	input	-	(<)
a(5)	a(5)	input	-	(<)

4.
```
do i = 1, 10
  a(10-i) = a(5) + a(i)
enddo
```

source reference	sink reference	type	distance vector	direction vector
a(10-i)	a(5)	true	-	(<)
a(5)	a(10-i)	anti	-	(<)
a(10-i)	a(i)	true	-	(<)
a(i)	a(10-i)	anti	-	(<)
a(5)	a(i)	input	-	(<)
a(i)	a(5)	input	-	(<)
a(5)	a(5)	input	-	(<)