Exercise 2

Jan 24/29, 2008

1. (10pts) Given the following loop nest,

```
for (int i = 0; i < 100; i =i + 2) {
  for (int j = 0; j < 50; ++j) {
     a[i][j] = a[i-1][j+1] + a[i][j-1];
  }
}
```

   Formulate a set of constraints that must be satisfied in order for two loop iterations (i, j) and (i', j') to depend on one another.

2. (10pts) Given the following C code,

```
int a[100];
int *p, *[q = a+100]1;
for ([p = a]2; [p < q]3; [++p]4) {
   [*p = 0]5;
}
```

   If we associate each pointer variable with a base location and an offset to the base, apply abstract interpretation to the given code and decide a location for each pointer variable.

3. (10pts) Given the following C code.

```
int a, b, c;
int *[p = &a]1, *[q = &b]2, *[r = &c]3;
[read(&a)]4;
if ([a < 0]5)
   [q = &c]6;
[*r = 2]7;
```

Apply the type inference approach to determine which pointer variables may be aliased to the same location.