

1. 针对以下循环 1:

```
for I = 0 to 3 do
  for J = 0 to 3 do
    A(I,J) = (A(I-1,J) + A(I,J-1)) / 2;
  endfor
endfor
```

1.1 描述以下循环中的存在依赖关系(包括迭代依赖图、依赖类型、依赖向量和距离向量等)

1.2 令  $K1 = I + J$  和  $K2 = J$  变换上述循环 1, 并给出新循环 2 的迭代依赖图:

```
for K1 = ... ..
  for K2 = ... ..
    A(..., ...) = ... ..
```

1.3 令  $K1 = I + J$  和  $K2 = I + 2 * J$  变换上述循环 1, 并给出新循环 3 的迭代依赖图:

```
for K1 = ... ..
  for K2 = ... ..
    A(..., ...) = ... ..
```

1.4 令  $K1 = 2 * I + J$  和  $K2 = 3 * I + 2 * J$  变换上述循环 1, 并给出新循环 4 的迭代依赖图:

```
for K1 = ... ..
  for K2 = ... ..
    A(..., ...) = ... ..
```

2. 尝试交换以下循环 5 的内外层循环。

```
for I = 1 to 8 do
  for J = max(I-3,1) to min(I,5) do
    A(I+1, J+1) = A(I,J) + B(I,J)
  endfor
endfor
```