

# CS325 - Project 3

Group #6

William Jernigan, Alexander Merrill, Sean Rettig

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## Correctness

### Equation 1

Given an array with an index starting at 0.

$$T[i, j] = \max \left\{ \begin{array}{ll} A[i, j] & \forall i, j \\ T[i-1, j] + A[i, j] & \text{if } i > 0 \\ T[i, j-1] + A[i, j] & \text{if } j > 0 \end{array} \right\}$$

Base Cases:

$$A[0, 0] = A[i, j]$$

## Pseudocode

```
load A[x,y] with values on board
initialize ybest, xbest, T[x,y] with 0
initialize P[x,y] with (-1,-1)
for i = 0 ... y
  for j = 0 ... x
    T[i,j] <- A[i,j]
    if i > 0
      if T[i-1,j] + A[i,j] > T[i,j]
        T[i,j] <- T[i-1,j] + A[i,j]
        P[i,j] <- pointer to A[i-1,j]
    if j > 0
      if T[i,j-1] + A[i,j] > T[i,j]
        T[i,j] <- T[i,j-1] + A[i,j]
        P[i,j] <- (i,j)
    if T[i,j] > T[ybest,xbest]
      ybest <- i
      xbest <- j
point.y <- ybest
point.x <- xbest
while point.y != -1 AND point.x != -1
  concat point with path
  point <- P[point.y,point.x]
```

## Running Time

$\Theta(ij)$

Populating the DP table just requires looping over the length and width of the grid, or  $i * j$ .