Upwind finite difference scheme

MA573 homework 12

(4) Write a pseudo code for value iteration.

Algorithm 1 Value iteration to solve the BVP: VI($\hat{\epsilon}, \hat{n}$)

Initialize $\hat{\epsilon}, \hat{n}$
Initial guess: $\{v(x) : x \in O^h\}$
$flag \leftarrow 1, n \leftarrow 0$
while $flag$ **do**
  $\epsilon \leftarrow 0$; $n \leftarrow n + 1$
  for $x \in O^h$ **do**
    $u(x) \leftarrow v(x)$
    $v(x) \leftarrow F^h u(x)$
    $\epsilon \leftarrow \max\{\epsilon | u(x) - v(x)|\}$
    if $\epsilon < \hat{\epsilon}$ **then**
      flag = 0
    end if
  end for
end while
return $\{v(x) : x \in O^h\}$

(5) Write a pseudo code for first visit Monte-Carlo method.

Algorithm 2 First visit Monte-Carlo method: MC(n)

Initialize $Tol = 0$
for $x \in O^h$ **do**
  for $i = 1, 2, \ldots, n$ **do**
    Generate $w_i = \{S_0 = x, R_1, S_1, \ldots, R_T, S_T, R_{T+1}\}$
    Compute $G \leftarrow \sum_{i=1}^{T+1} r^{i-1} R_i$
    $Tol \leftarrow Tol + G$
  end for
  return $v(x) \leftarrow \frac{Tol}{n}$
end for
return $\{v(x) : x \in O^h\}$