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IE 3013

A random walk. This is Sutton exercise 6.6. Refer to the example 6.2 (A Random Walk). State two different ways that could be used to compute the true state values v_π, where π is the random policy of moving to the left with probability 0.5 or to the right with probability 0.5. Choose one of the two methods and solve for v_π. That is to say, show that

$$v_\pi(A) = \frac{1}{6}, \quad v_\pi(B) = \frac{2}{6}, \quad v_\pi(C) = \frac{3}{6}, \quad v_\pi(D) = \frac{4}{6}, \quad v_\pi(E) = \frac{5}{6}$$

1) implement value iteration
or
2) write out the Bellman Eqns and solve

Let $P(s)$ = prob of reaching right end when starting in state s
$= V_\pi(s)$

$P(A) = \frac{1}{2}\cdot 0 + \frac{1}{2}\cdot P(B) = \frac{1}{2}\cdot 0 + \frac{1}{2}\cdot\frac{2}{6} = \boxed{\frac{1}{6} = V_\pi(A)}$

$P(B) = \frac{1}{2}\cdot P(A) + \frac{1}{2}\cdot P(C) = \frac{1}{2}\cdot\frac{1}{6} + \frac{1}{2}\cdot\frac{3}{6} = \boxed{\frac{2}{6} = V_\pi(B)}$

$P(C) = \frac{1}{2}\cdot P(B) + \frac{1}{2}\cdot P(D) = \frac{1}{2}\cdot\frac{2}{6} + \frac{1}{2}\cdot\frac{4}{6} = \boxed{\frac{3}{6} = V_\pi(C)}$

$P(D) = \frac{1}{2}\cdot P(C) + \frac{1}{2}\cdot P(E) = \frac{1}{2}\cdot\frac{3}{6} + \frac{1}{2}\cdot\frac{5}{6} = \boxed{\frac{4}{6} = V_\pi(D)}$

$P(E) = \frac{1}{2}\cdot P(D) + \frac{1}{2}\cdot 1 = \frac{1}{2}\cdot\frac{5}{6} + \frac{1}{2}\cdot 1 = \boxed{\frac{5}{6} = V_\pi(E)}$