CS234 - Winter 2021 - Quiz 0

1 What is the value of the geometric series $\sum_{i=1}^{\infty} \gamma^i$ for some $0 < \gamma < 1$?

(a) ∞

(b) $\frac{1}{1-\gamma}$

(c) $\frac{\gamma}{1-\gamma}$

(d) undefined (the series does not converge)

2 Consider the vectors $x_1 = [1, 0, 0]$ and $x_2 = [0, 1, 0]$. How many vectors $v \in \mathbb{R}^3$ with unitary norm (i.e., $\|v\|_2 = 1$) are there that are orthogonal to x_1 and x_2 (i.e., $v^\top x_1 = 0$ and $v^\top x_2 = 0$)?

(a) none

(b) 1

(c) 2

(d) ∞

3 A lost tourist arrives at a point with 2 roads A and B. Road A leads to the city and takes either 1 or 3 hours, depending on traffic, with equal probability. Road B brings him to the city after 4 hours on average. Since there are no signs on the road, the tourist chooses a road with equal probability; what is the mean time until the tourist arrives to the city?

(a) 2 hours

(b) 2.5 hours

(c) 3 hours

(d) none of the above

4 In the lecture modules we showed that the Bellman operator is a contraction if $\gamma < 1$. Consider doing value iteration with $\gamma = 0$. How many iterations will it take for value iteration to converge to the optimal value function?

(a) 1

(b) 5

(c) 100

(d) unbounded