6.3 QUIZ QUESTION 1 (1/1 point)

Which of the following is an equivalent recursive specification for the sequence $x(n) = 0.5 \cdot n + 1$?

Select the correct answer.

- $x(0) = 0, x(n) = x(n-1) + 0.5$
- $x(0) = 0, x(n) = 0.5 \cdot x(n-1)$
- $x(n) = 0.5 \cdot (n+2)$
- $x(0) = 1, x(n) = x(n-1) + 0.5$ ✔
- $x(0) = 1, x(n) = 0.5 \cdot x(n-1)$

EXPLANATION

Base cases:

By inspection, the explicit formula and the recursive specification both give x(0) = 1.

For n = 1, using the explicit formula, $x(1) = 0.5 \cdot 1 + 1 = 1.5$

For n = 1, using the recursive formulation, $x(1) = x(0) + 0.5 = 1 + 0.5 = 1.5$

Thus, the explicit formula and the recursive formulation are the same for n = 1.

Inductive step:

Assume that for $n \geq 1$, $x(n) = 0.5 \cdot n + 1$ and $x(n) = x(n-1) + 0.5$.

By the recursive formulation, $x(n+1) = x(n) + 0.5$

Substituting $x(n) = 0.5 \cdot n + 1$, we obtain

$$x(n+1) = (0.5 \cdot n + 1) + 0.5 = 0.5 \cdot (n+1) + 1$$

Thus, by mathematical induction, the two are equivalent.

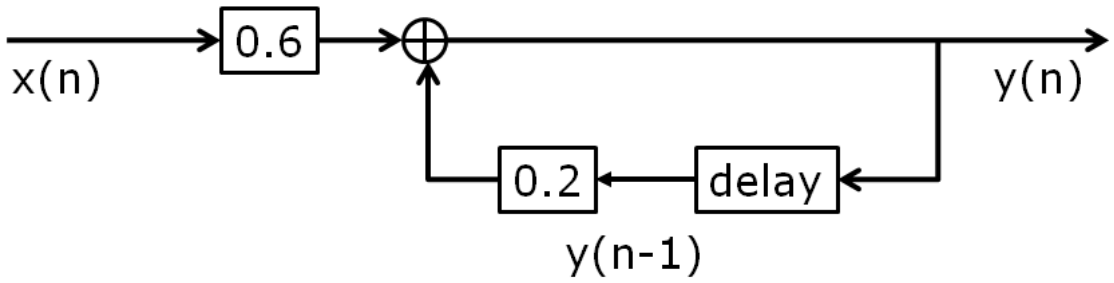
Although the third answer is equivalent, it is not recursive.

Hide Answer *You have used 2 of 2 submissions*

Help

6.3 QUIZ QUESTION 2 (1/1 point)

The response of a channel, y(n), to an input, x(n), can be modelled by the following recursive system:



Assume $x(0:4) = [01110]$, and $y(0) = 0$. Determine the value of the output $y(2)$.

Please key in the numerical value of your answer to two significant digits in the box provided below.

0.72

0.72

Answer: 0.72

EXPLANATION

This channel response can be determined iteratively using $y(n) = 0.2 \cdot y(n-1) + 0.6 \cdot x(n)$.

$y(1) = 0.2 \cdot y(0) + 0.6 \cdot x(1) = 0.2 \cdot 0 + 0.6 \cdot 1 = 0.6$

$y(2) = 0.2 \cdot y(1) + 0.6 \cdot x(2) = 0.2 \cdot 0.6 + 0.6 \cdot 1 = 0.72$

Check Save Hide Answer *You have used 1 of 3 submissions*

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