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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.

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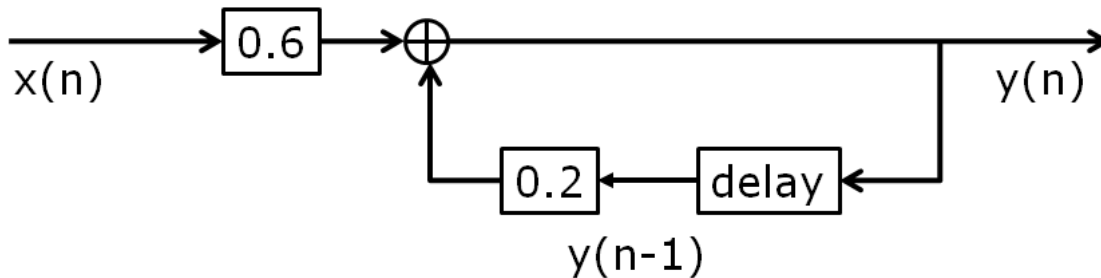
Hide Answer

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

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