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EXERCISE: USING COUNTABLE ADDITIVITY (1/1 point)

Let the sample space be the set of positive integers and suppose that $\mathbf{P}(n) = 1/2^n$, for $n = 1, 2, \ldots$. Find the probability of the set $\{3, 6, 9, \ldots\}$, that is, of the set of of positive integers that are multiples of 3.

| 1/7 |

✔ **Answer:** 0.14286

Answer:
Using countable additivity, and with $\alpha = 2^{-3} = 1/8$, the desired probability is

$$\frac{1}{2^3} + \frac{1}{2^6} + \frac{1}{2^9} + \cdots = \alpha + \alpha^2 + \alpha^3 + \cdots = \frac{\alpha}{1-\alpha} = \frac{1/8}{1-(1/8)} = \frac{1}{7}.$$

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