Laurent Series and z-Transform - Case Examples 0.B

20170205

		① $\frac{3}{2}\frac{-1}{(z-0.5)(z-2)}$	② $\frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)}$
$\lvert z\rvert < \frac{1}{2}$	$f(z)$	case Ⅲ	case Ⅳ
	$X(z)$	case Ⅲ	case Ⅳ
$\lvert z\rvert > 2$	$f(z)$	case Ⅲ	case Ⅳ
	$X(z)$	case Ⅲ	case Ⅳ

case Ⅰ $\quad f(z) = \frac{3}{2}\frac{-1}{(z-0.5)(z-2)} \qquad X(z) = \frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)}$

case Ⅱ $\quad f(z) = \frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)} \qquad X(z) = \frac{3}{2}\frac{-1}{(z-0.5)(z-2)}$

case Ⅲ $\quad f(z) = \frac{3}{2}\frac{-1}{(z-0.5)(z-2)} \qquad X(z) = \frac{3}{2}\frac{-1}{(z-0.5)(z-2)}$

case Ⅳ $\quad f(z) = \frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)} \qquad X(z) = \frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)}$

		① $\frac{3}{2}\frac{-1}{(z-0.5)(z-2)}$	② $\frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)}$
$\lvert z\rvert < \frac{1}{2}$	$f(z)$	case Ⅰ $(n \geq 0)$	case Ⅱ $(n > 0)$
	$X(z)$	case Ⅱ $(n \leq 0)$	case Ⅰ $(n < 0)$
$\lvert z\rvert > 2$	$f(z)$	case Ⅰ $(n < 0)$	case Ⅱ $(n \leq 0)$
	$X(z)$	case Ⅱ $(n > 0)$	case Ⅰ $(n \geq 0)$

case Ⅰ $\quad f(z) = \frac{3}{2}\frac{-1}{(z-0.5)(z-2)} \qquad X(z) = \frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)}$

case Ⅱ $\quad f(z) = \frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)} \qquad X(z) = \frac{3}{2}\frac{-1}{(z-0.5)(z-2)}$

case Ⅲ $\quad f(z) = \frac{3}{2}\frac{-1}{(z-0.5)(z-2)} \qquad X(z) = \frac{3}{2}\frac{-1}{(z-0.5)(z-2)}$

case Ⅳ $\quad f(z) = \frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)} \qquad X(z) = \frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)}$

		① $\frac{3}{2}\cdot\frac{-1}{(z-0.5)(z-2)}$	② $\frac{3}{2}\cdot\frac{-z^2}{(z-2)(z-0.5)}$
$\lvert z\rvert < \frac{1}{2}$	$f(z)$	case Ⅰ $(n \geq 0)$	$-n$
	$X(z)$		$-n$ case Ⅰ $(n < 0)$
$\lvert z\rvert > 2$	$f(z)$	case Ⅰ $(n < 0)$	$-n$
	$X(z)$		$-n$ case Ⅰ $(n \geq 0)$

		① $\frac{3}{2}\cdot\frac{-1}{(z-0.5)(z-2)}$	② $\frac{3}{2}\cdot\frac{-z^2}{(z-2)(z-0.5)}$
$\lvert z\rvert < \frac{1}{2}$	$f(z)$	$-n$ $-n$	case Ⅱ $(n > 0)$
	$X(z)$	case Ⅱ $(n \leq 0)$	
$\lvert z\rvert > 2$	$f(z)$	$-n$ $-n$	case Ⅱ $(n \leq 0)$
	$X(z)$	case Ⅱ $(n > 0)$	

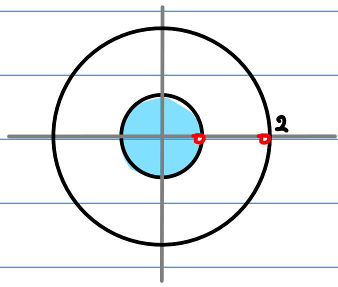
		① $\frac{3}{2}\frac{-1}{(z-0.5)(z-2)}$	② $\frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)}$
$\lvert z\rvert < \frac{1}{2}$	$f(z)$	case III	$-n$
	$X(z)$	case III	
$\lvert z\rvert > 2$	$f(z)$	case III	$-n$
	$X(z)$	case III	

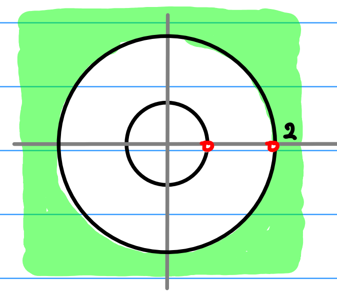
		① $\frac{3}{2}\frac{-1}{(z-0.5)(z-2)}$	② $\frac{3}{2}\frac{-z^2}{(z-2)(z-0.5)}$
$\lvert z\rvert < \frac{1}{2}$	$f(z)$	$-n$	case IV
	$X(z)$		case IV
$\lvert z\rvert > 2$	$f(z)$	$-n$	case IV
	$X(z)$		case IV

1.B

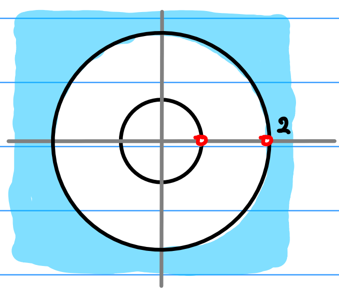
$$f(z) = \frac{3}{2}\,\frac{-1}{(z-0.5)(z-2)} \xleftrightarrow{z^{-1}} X(z) = \frac{3}{2}\,\frac{-z^2}{(z-2)(z-0.5)}$$

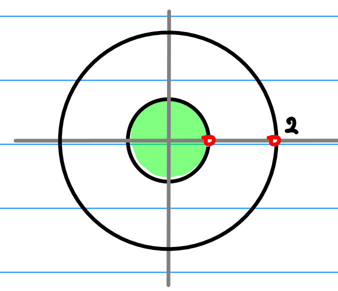
$$-\frac{2}{1-2z} + \frac{0.5}{1-0.5z} \qquad\qquad -\frac{z}{1-2z} + \frac{z}{1-0.5z}$$



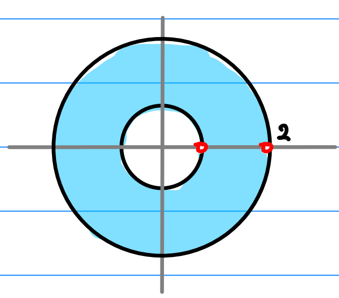


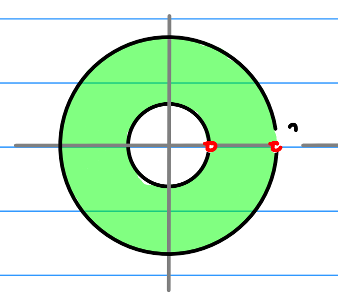
$$\sum_{n=0}^{\infty}\left[\left(\tfrac{1}{2}\right)^{n+1} - 2^{n+1}\right] z^{n} = \sum_{n=0}^{\infty}\left[\left(\tfrac{1}{2}\right)^{n+1} - 2^{n+1}\right] z^{-n}$$





$$\sum_{n=-1}^{-\infty}\left[2^{n+1} - \left(\tfrac{1}{2}\right)^{n+1}\right] z^{n} = \sum_{n=-1}^{\infty}\left[2^{n+1} - \left(\tfrac{1}{2}\right)^{n+1}\right] z^{-n}$$

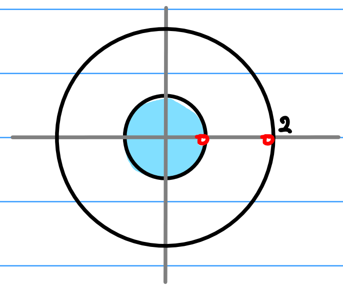


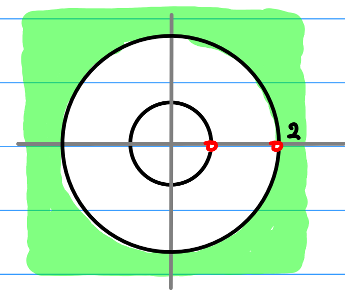


$$\sum_{n=-1}^{\infty} 2^{n+1} z^{n} + \sum_{n=0}^{\infty}\left(\tfrac{1}{2}\right)^{n+1} z^{n} = \sum_{n=-1}^{-\infty} 2^{n+1} z^{-n} + \sum_{n=0}^{\infty}\left(\tfrac{1}{2}\right)^{n+1} z^{-n}$$

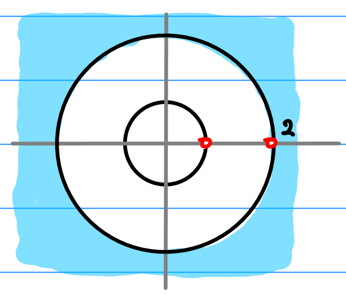
2. B

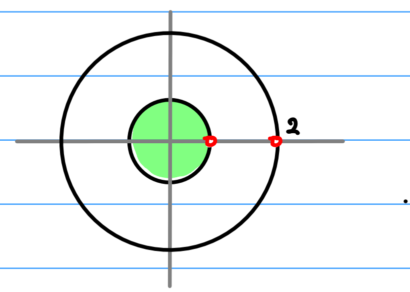
$$f(z) = \frac{3}{2}\,\frac{-z^2}{(z-2)(z-0.5)} \xleftrightarrow{z^{-1}} X(z) = \frac{3}{2}\,\frac{-1}{(z-0.5)(z-2)}$$



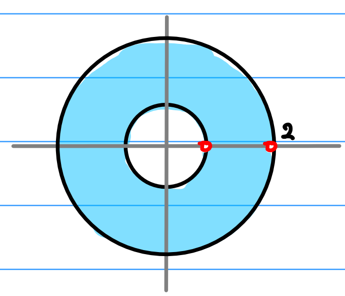


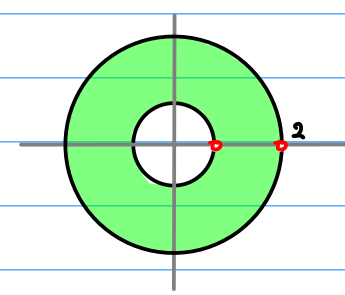
$$\sum_{n=1}^{\infty}\left[\left(\tfrac{1}{2}\right)^{n-1} - 2^{n-1}\right] z^{-n} = \sum_{n=1}^{\infty}\left[\left(\tfrac{1}{2}\right)^{n-1} - 2^{n-1}\right] z^{n}$$





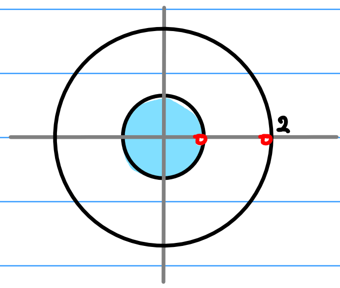
$$\sum_{n=0}^{-\infty}\left[2^{n-1} - \left(\tfrac{1}{2}\right)^{n-1}\right] z^{-n} = \sum_{n=0}^{-\infty}\left[2^{n-1} - \left(\tfrac{1}{2}\right)^{n-1}\right] z^{n}$$

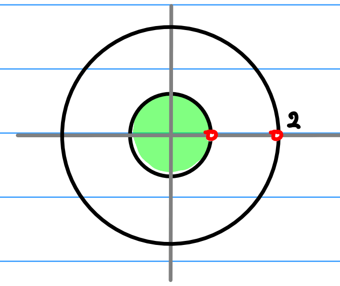




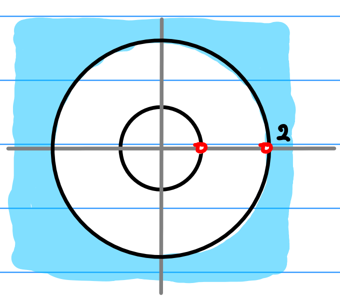
$$\sum_{n=1}^{\infty}\left(\tfrac{1}{2}\right)^{n-1} z^{-n} + \sum_{n=0}^{-\infty} 2^{n-1} z^{-n} = \sum_{n=0}^{-\infty} 2^{n-1} z^{n} + \sum_{n=1}^{\infty}\left(\tfrac{1}{2}\right)^{n-1} z^{n}$$

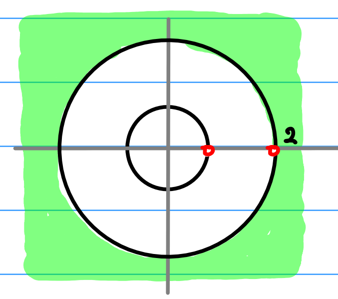
3 . B $f(z) = \frac{3}{2}\,\frac{-1}{(z-1)(z-2)} \quad = \quad X(z) = \frac{3}{2}\,\frac{-1}{(z-1)(z-2)}$



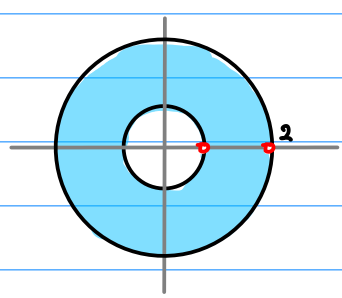


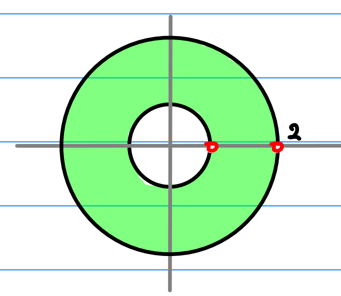
$$\sum_{n=0}^{\infty}\left[\left(\tfrac{1}{2}\right)^{n+1} - 2^{n+1}\right] z^{n} \quad \xleftrightarrow{\;-n\;} \quad \sum_{n=0}^{-\infty}\left[2^{n-1} - \left(\tfrac{1}{2}\right)^{n-1}\right] z^{-n}$$





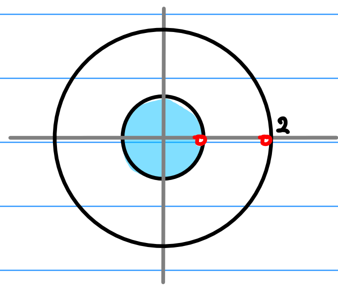
$$\sum_{n=-1}^{\infty}\left[2^{n+1} - \left(\tfrac{1}{2}\right)^{n+1}\right] z^{n} \quad \xleftrightarrow{\;-n\;} \quad \sum_{n=1}^{\infty}\left[\left(\tfrac{1}{2}\right)^{n-1} - 2^{n-1}\right] z^{-n}$$

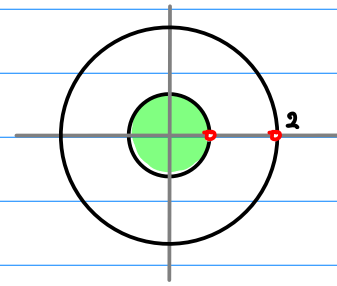




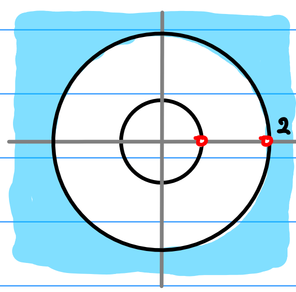
$$\sum_{n=-1}^{\infty} 2^{n+1} z^{n} + \sum_{n=0}^{\infty}\left(\tfrac{1}{2}\right)^{n+1} z^{n} \quad \xleftrightarrow{\;-n\;} \quad \sum_{n=1}^{\infty}\left(\tfrac{1}{2}\right)^{n-1} z^{-n} + \sum_{n=0}^{-\infty} 2^{n-1} z^{-n}$$

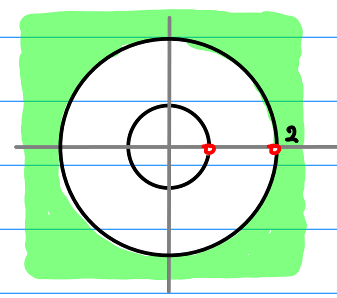
4.B $f(z) = \frac{3}{2}\,\frac{-0.5\,z^2}{(z-1)(z-0.5)} = X(z) = \frac{3}{2}\,\frac{-0.5\,z^2}{(z-1)(z-0.5)}$



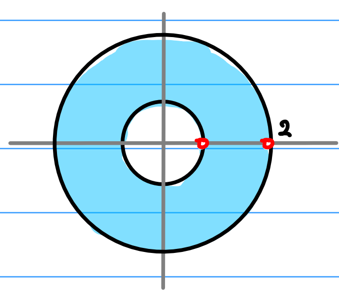


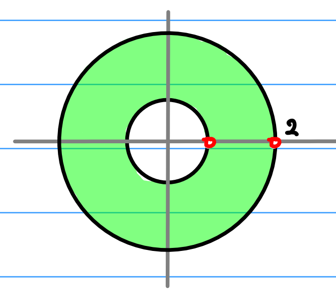
$$\sum_{n=1}^{\infty}\left[\left(\tfrac{1}{2}\right)^{n-1} - 2^{n-1}\right] z^n \xleftrightarrow{-n} \sum_{n=-1}^{-\infty}\left[2^{n+1} - \left(\tfrac{1}{2}\right)^{n+1}\right] z^{-n}$$





$$\sum_{n=0}^{-\infty}\left[2^{n-1} - \left(\tfrac{1}{2}\right)^{n-1}\right] z^n \xleftrightarrow{-n} \sum_{n=0}^{\infty}\left[\left(\tfrac{1}{2}\right)^{n+1} - 2^{n+1}\right] z^{-n}$$



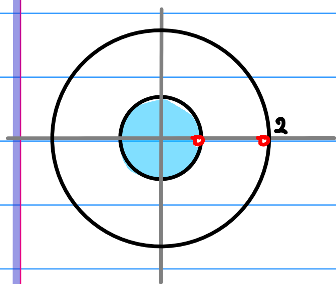


$$\sum_{n=0}^{-\infty} 2^{n-1} z^n + \sum_{n=1}^{\infty}\left(\tfrac{1}{2}\right)^{n-1} z^n \xleftrightarrow{-n} \sum_{n=0}^{\infty}\left(\tfrac{1}{2}\right)^{n+1} z^{-n} + \sum_{n=-1}^{-\infty} 2^{n+1} z^{-n}$$

1.B

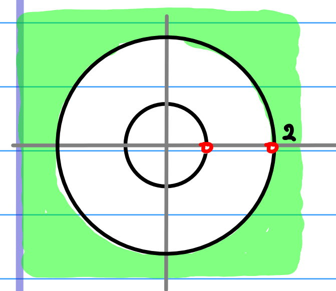
$$f(z) = \frac{3}{2}\,\frac{-1}{(z-0.5)(z-2)} \xleftrightarrow{z^{-1}} X(z) = \frac{3}{2}\,\frac{-z^2}{(z-2)(z-0.5)}$$

Ⅰ



$$a_n = \begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases}$$

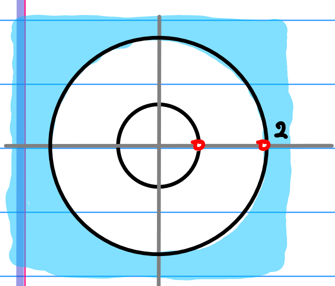
$$f(z) = \sum_{n=0}^{\infty} \left[\left(\tfrac{1}{2}\right)^{n+1} - 2^{n+1}\right] z^n$$



$$x_n = \begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases}$$

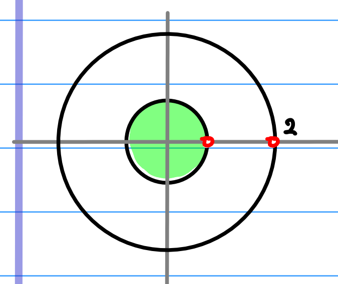
$$X(z) = \sum_{n=0}^{\infty} \left[\left(\tfrac{1}{2}\right)^{n+1} - 2^{n+1}\right] z^{-n}$$

Ⅱ



$$a_n = \begin{cases} 0 & (n \geq 0) \\ 2^{n+1} - \left(\frac{1}{2}\right)^{n+1} & (n < 0) \end{cases}$$

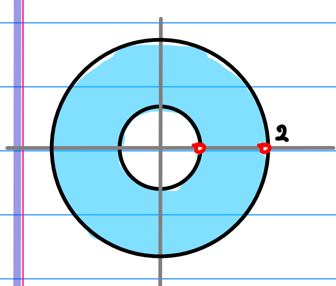
$$f(z) = \sum_{n=-1}^{-\infty} \left[2^{n+1} - \left(\tfrac{1}{2}\right)^{n+1}\right] z^n$$



$$x_n = \begin{cases} 0 & (n \geq 0) \\ 2^{n+1} - \left(\frac{1}{2}\right)^{n+1} & (n < 0) \end{cases}$$

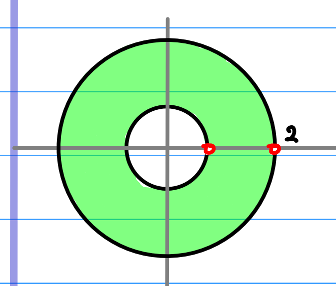
$$X(z) = \sum_{n=-1}^{\infty} \left[2^{n+1} - \left(\tfrac{1}{2}\right)^{n+1}\right] z^{-n}$$

Ⅲ



$$a_n = \begin{cases} \left(\frac{1}{2}\right)^{n+1} & (n \geq 0) \\ 2^{n+1} & (n < 0) \end{cases}$$

$$f(z) = \sum_{n=-1}^{\infty} 2^{n+1} z^n + \sum_{n=0}^{\infty} \left(\tfrac{1}{2}\right)^{n+1} z^n$$



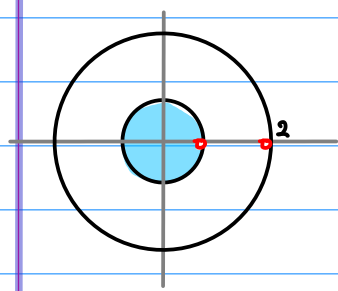
$$x_n = \begin{cases} 2^{n+1} & (n \geq 0) \\ \left(\frac{1}{2}\right)^{n+1} & (n < 0) \end{cases}$$

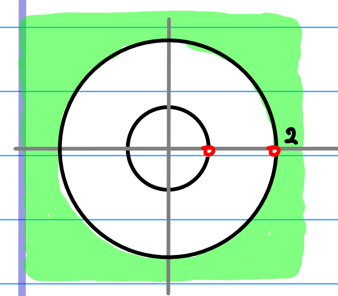
$$X(z) = \sum_{n=-1}^{-\infty} 2^{n+1} z^{-n} + \sum_{n=0}^{\infty} \left(\tfrac{1}{2}\right)^{n+1} z^{-n}$$

2.B

$$f(z)=\frac{3}{2}\,\frac{-z^2}{(z-2)(z-0.5)} \xleftrightarrow{z^{-1}} X(z)=\frac{3}{2}\,\frac{-1}{(z-0.5)(z-2)}$$

Ⅰ





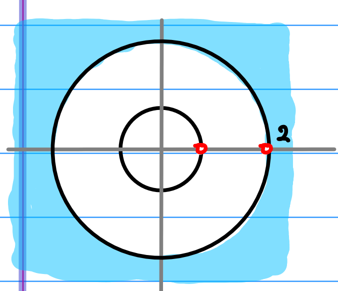
$$a_n=\begin{cases}\left[\left(\frac{1}{2}\right)^{n-1}-2^{n-1}\right] & (n>0)\\ 0 & (n\leq 0)\end{cases}$$

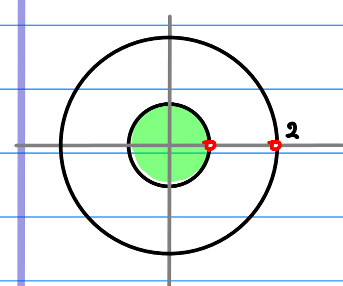
$$x_n=\begin{cases}\left[\left(\frac{1}{2}\right)^{n-1}-2^{n-1}\right] & (n>0)\\ 0 & (n\leq 0)\end{cases}$$

$$f(z)=\sum_{n=1}^{\infty}\left[\left(\frac{1}{2}\right)^{n-1}-2^{n-1}\right]z^{-n}$$

$$X(z)=\sum_{n=1}^{\infty}\left[\left(\frac{1}{2}\right)^{n-1}-2^{n-1}\right]z^{n}$$

Ⅱ





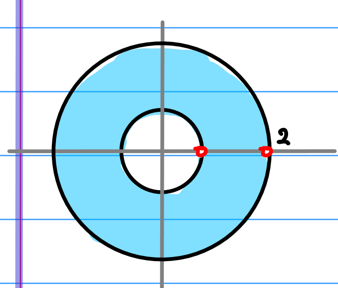
$$a_n=\begin{cases}0 & (n>0)\\ \left[2^{n-1}-\left(\frac{1}{2}\right)^{n-1}\right] & (n\leq 0)\end{cases}$$

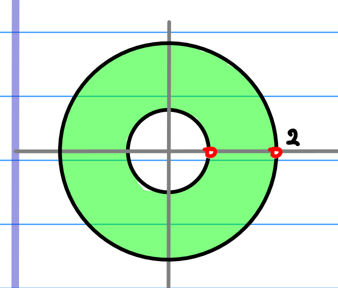
$$x_n=\begin{cases}0 & (n>0)\\ \left[2^{n-1}-\left(\frac{1}{2}\right)^{n-1}\right] & (n\leq 0)\end{cases}$$

$$f(z)=\sum_{n=0}^{-\infty}\left[2^{n-1}-\left(\frac{1}{2}\right)^{n-1}\right]z^{-n}$$

$$X(z)=\sum_{n=0}^{-\infty}\left[2^{n-1}-\left(\frac{1}{2}\right)^{n-1}\right]z^{n}$$

Ⅲ





$$a_n=\begin{cases}\left(\frac{1}{2}\right)^{n-1} & (n>0)\\ 2^{n-1} & (n\leq 0)\end{cases}$$

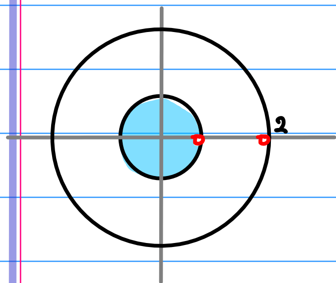
$$x_n=\begin{cases}\left(\frac{1}{2}\right)^{n-1} & (n>0)\\ 2^{n-1} & (n\leq 0)\end{cases}$$

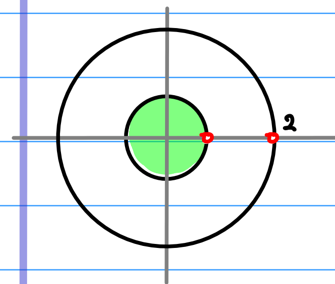
$$f(z)=\sum_{n=0}^{-\infty}2^{n-1}z^{-n}+\sum_{n=1}^{\infty}\left(\frac{1}{2}\right)^{n-1}z^{-n}$$

$$X(z)=\sum_{n=0}^{-\infty}2^{n-1}z^{n}+\sum_{n=1}^{\infty}\left(\frac{1}{2}\right)^{n-1}z^{n}$$

3 . B $\quad f(z) = \frac{3}{2}\frac{-1}{(z-1)(z-2)} \quad = \quad X(z) = \frac{3}{2}\frac{-1}{(z-1)(z-2)}$

Ⓘ





$$a_n = \begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases}$$

$$x_n = \begin{cases} 0 & (n > 0) \\ 2^{n-1} - \left(\frac{1}{2}\right)^{n-1} & (n \leq 0) \end{cases}$$

$$f(z) = \sum_{n=0}^{\infty} \left[\left(\tfrac{1}{2}\right)^{n+1} - 2^{n+1}\right] z^n$$

$$X(z) = \sum_{n=0}^{-\infty} \left[2^{n-1} - \left(\tfrac{1}{2}\right)^{n-1}\right] z^{-n}$$

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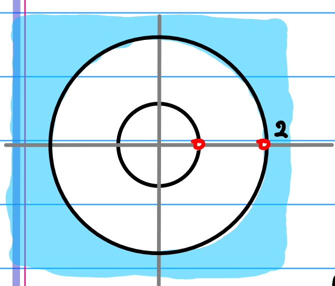
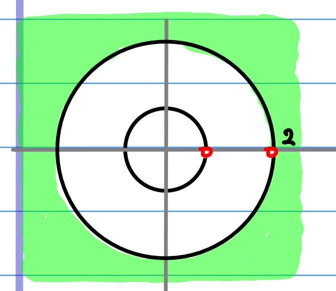




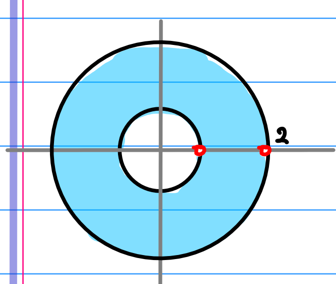
$$a_n = \begin{cases} 0 & (n \geq 0) \\ 2^{n+1} - \left(\frac{1}{2}\right)^{n+1} & (n < 0) \end{cases}$$

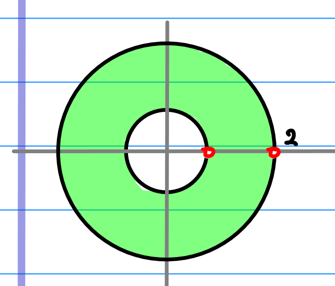
$$x_n = \begin{cases} \left(\frac{1}{2}\right)^{n-1} - 2^{n-1} & (n > 0) \\ 0 & (n \leq 0) \end{cases}$$

$$f(z) = \sum_{n=-1}^{\infty} \left[2^{n+1} - \left(\tfrac{1}{2}\right)^{n+1}\right] z^n$$

$$X(z) = \sum_{n=1}^{\infty} \left[\left(\tfrac{1}{2}\right)^{n-1} - 2^{n-1}\right] z^{-n}$$

Ⓘ





$$a_n = \begin{cases} \left(\frac{1}{2}\right)^{n+1} & (n \geq 0) \\ 2^{n+1} & (n < 0) \end{cases}$$

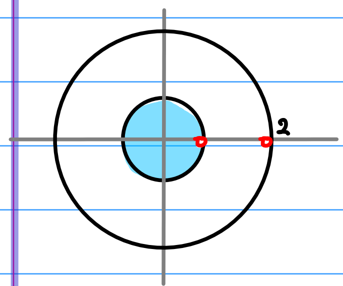
$$x_n = \begin{cases} \left(\frac{1}{2}\right)^{n-1} & (n > 0) \\ 2^{n-1} & (n \leq 0) \end{cases}$$

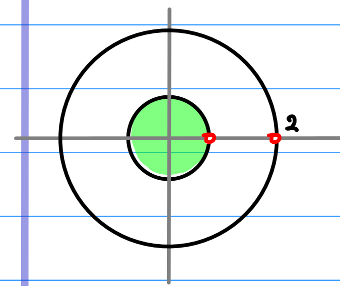
$$f(z) = \sum_{n=-1}^{\infty} 2^{n+1} z^n + \sum_{n=0}^{\infty} \left(\tfrac{1}{2}\right)^{n+1} z^n$$

$$X(z) = \sum_{n=1}^{\infty} \left(\tfrac{1}{2}\right)^{n-1} z^{-n} + \sum_{n=0}^{-\infty} 2^{n-1} z^{-n}$$

4.B $f(z) = \frac{3}{2}\frac{-0.5z^2}{(z-1)(z-0.5)}$ $=$ $X(z) = \frac{3}{2}\frac{-0.5z^2}{(z-1)(z-0.5)}$

Ⅰ





$$a_n = \begin{cases} \left(\frac{1}{2}\right)^{n-1} - 2^{n-1} & (n>0) \\ 0 & (n \leq 0) \end{cases}$$

$$x_n = \begin{cases} 0 & (n \geq 0) \\ 2^{n+1} - \left(\frac{1}{2}\right)^{n+1} & (n<0) \end{cases}$$

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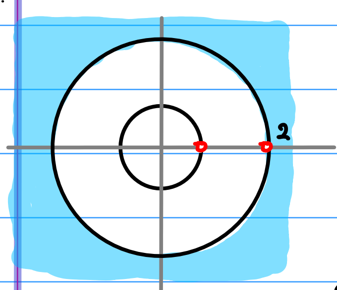

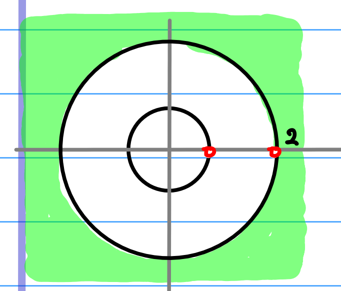

$$a_n = \begin{cases} 0 & (n>0) \\ 2^{n-1} - \left(\frac{1}{2}\right)^{n-1} & (n \leq 0) \end{cases}$$

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$$f(z) = \sum_{n=0}^{-\infty} \left[2^{n-1} - \left(\frac{1}{2}\right)^{n-1}\right] z^n$$

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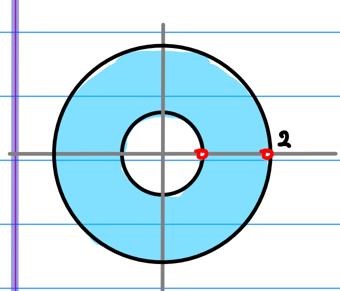
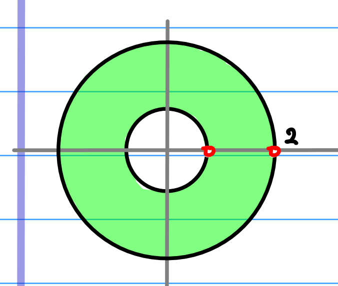
Ⅲ





$$a_n = \begin{cases} 2^{n-1} & (n>0) \\ \left(\frac{1}{2}\right)^{n-1} & (n \leq 0) \end{cases}$$

$$x_n = \begin{cases} \left(\frac{1}{2}\right)^{n+1} & (n \geq 0) \\ 2^{n+1} & (n<0) \end{cases}$$

$$f(z) = \sum_{n=0}^{-\infty} 2^{n-1} z^n + \sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^{n-1} z^n$$

$$X(z) = \sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^{n+1} z^{-n} + \sum_{n=-1}^{-\infty} 2^{n+1} z^{-n}$$

$f(z) \xleftrightarrow{z^{-1}} X(z)$ $\qquad$ $a_n = x_n$

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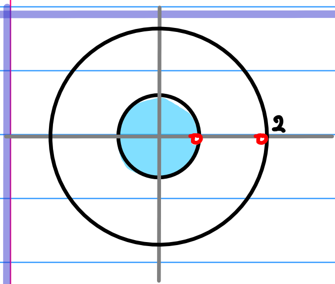
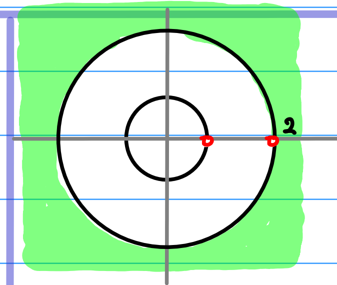


$$\begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases}$$



$$\begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n > 0) \\ 0 & (n \leq 0) \end{cases}$$

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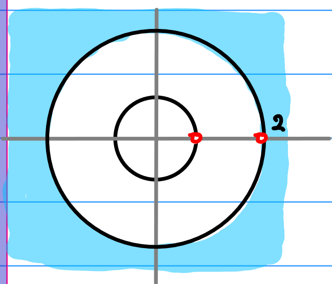
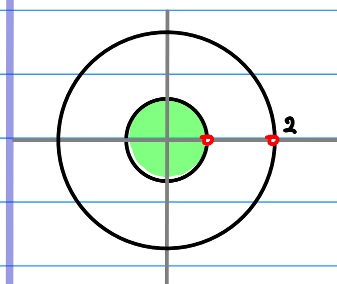


$$\begin{cases} 0 & (n \geq 0) \\ 2^{n+1} - \left(\frac{1}{2}\right)^{n+1} & (n < 0) \end{cases}$$



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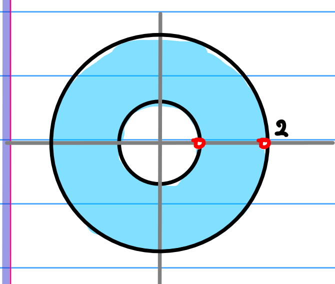
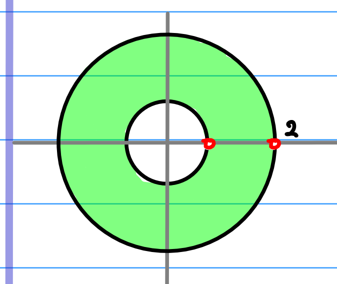


$$\begin{cases} \left(\frac{1}{2}\right)^{n+1} & (n \geq 0) \\ 2^{n+1} & (n < 0) \end{cases}$$



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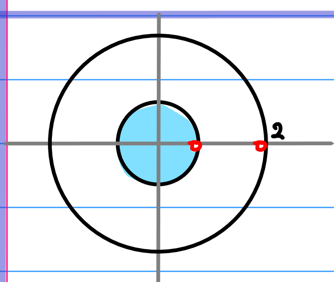
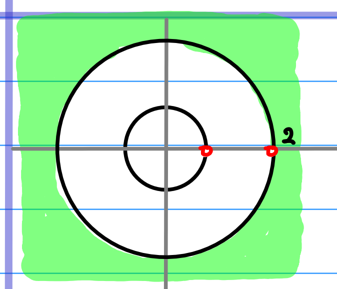


$$\begin{cases} \left(\frac{1}{2}\right)^{n-1} - 2^{n-1} & (n > 0) \\ 0 & (n \leq 0) \end{cases}$$



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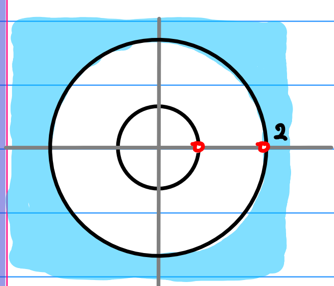
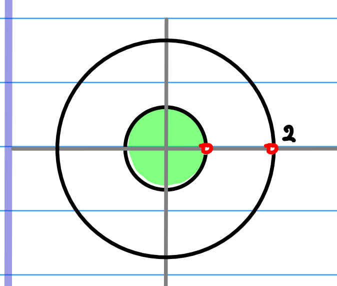


$$\begin{cases} 0 & (n > 0) \\ 2^{n-1} - \left(\frac{1}{2}\right)^{n-1} & (n \leq 0) \end{cases}$$



$$\begin{cases} 0 & (n \geq 0) \\ 2^{n-1} - \left(\frac{1}{2}\right)^{n-1} & (n < 0) \end{cases}$$

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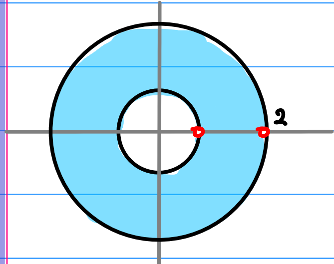

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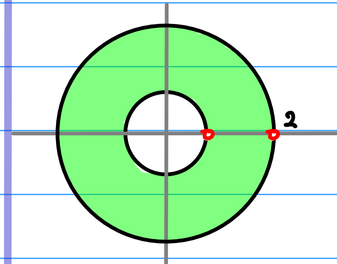

$$\begin{cases} \left(\frac{1}{2}\right)^{n-1} & (n \geq 0) \\ 2^{n-1} & (n < 0) \end{cases}$$

$f(z) = X(z)$ $\qquad$ $a_n \xleftrightarrow{-n} x_n$

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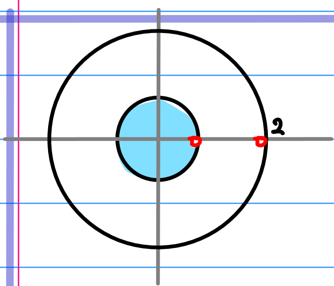
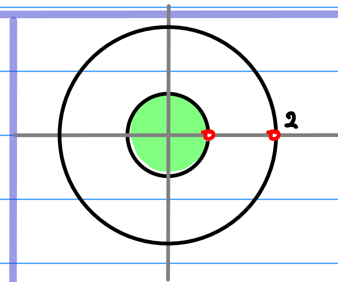


$$\begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases}$$



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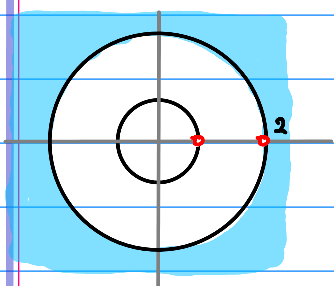

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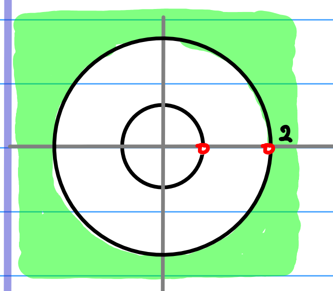

$$\begin{cases} 2^{n-1} - \left(\frac{1}{2}\right)^{n-1} & (n > 0) \\ 0 & (n \leq 0) \end{cases}$$

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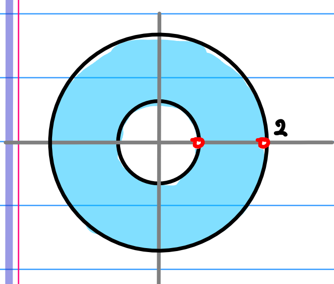

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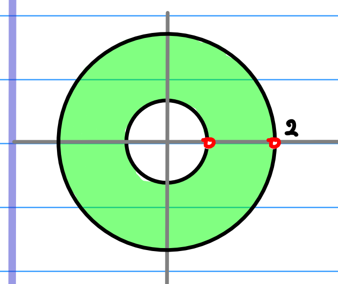

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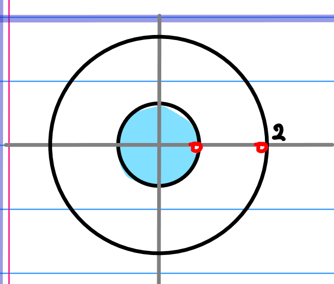

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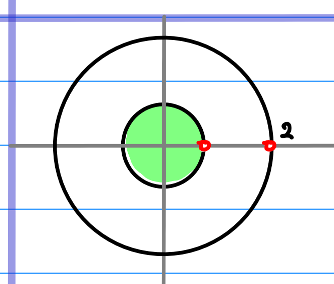

$$\begin{cases} 0 & (n \geq 0) \\ \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n < 0) \end{cases}$$

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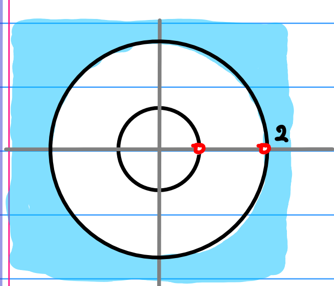
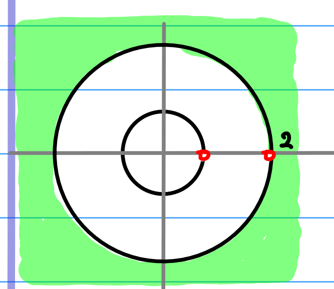


$$\begin{cases} 0 & (n > 0) \\ 2^{n-1} - \left(\frac{1}{2}\right)^{n-1} & (n \leq 0) \end{cases}$$



$$\begin{cases} 2^{n+1} - \left(\frac{1}{2}\right)^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases}$$

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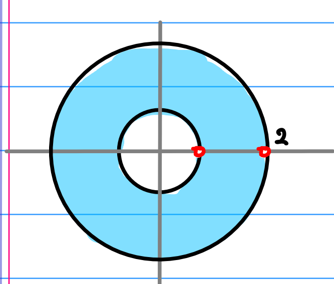

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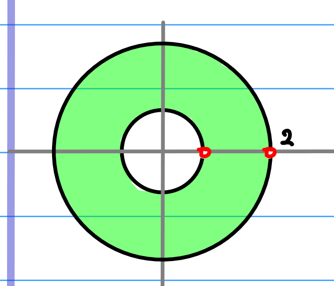

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$f(z) \xleftrightarrow{z^{-1}} X(z)$ $\qquad$ $a_n = x_n$

Ⅰ

$P_1 = 0.5$, $P_2 = 2$

$$\begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases}$$

$$\begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases}$$

$P_1 = 0.5$, $P_2 = 2$

$*-1$ $\qquad$ $*-1$

Ⅱ

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$$\begin{cases} \left(\frac{1}{2}\right)^{n-1} - 2^{n-1} & (n > 0) \\ 0 & (n \leq 0) \end{cases}$$

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$P_1 = 0.5$, $P_2 = 2$

$$f(z) = X(z) \qquad a_n \xleftrightarrow{-n} x_n$$

Ⅰ

$p_1 = 0.5$, $p_2 = 2$

$$\begin{cases} \left(\frac{1}{2}\right)^{n+1} - 2^{n+1} & (n \geq 0) \\ 0 & (n < 0) \end{cases} \qquad \begin{cases} 0 & (n > 0) \\ 2^{n-1} - \left(\frac{1}{2}\right)^{n-1} & (n \leq 0) \end{cases}$$

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$*-1$ $\qquad$ $*-1$

Ⅱ

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$p_1 = 0.5$, $p_2 = 2$

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$p_1 = 0.5$, $p_2 = 2$

$*-1$ $\qquad$ $*-1$

Ⅱ

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