EVERETT FORMULA:

$$y_p = \sum_{i=0}^{n}\left[\binom{p+i}{2i+1}\delta^{2i}y_1 - \binom{p+i-1}{2i+1}\delta^{2i}y_0\right]$$

Collocation is $p=-n,\ldots,n+1$.

This formula is used for $p\in(0,1)$,
for accuracy, $p\le 0.75$.

EXAMPLE: Use Everett formula to estimate $\log_{10} 337.5$ from the following data:

x	$\log_{10} x$
310	2.4913617
320	2.5051500
330	2.5185139
340	2.5314789
350	2.5440680
360	2.5563025

$x = 337.5$, $h=10$, $x_0 = 330$

$$p = \frac{337.5-330}{10} = 0.75$$

-2	310	2.4913617					
			0.0137883				
-1	320	2.5051500		-0.0004244			
			0.0133639		0.0000255		
0	330	2.5185139 y_0		-0.0003989 $\delta^2 y_0$		-0.0000025 $\delta^4 y_0$	
			0.012965		0.000023		0.0000008
1	340	2.5314789 y_1		-0.0003759 $\delta^2 y_1$		-0.0000017 $\delta^4 y_1$	
			0.0125891		0.0000213		
2	350	2.5440680		-0.0003546			
			0.0122345				
3	360	2.5563025					

collocation is at $p = -2, \ldots, 3$.

Substitute $n=2$ in the Everett formula:

$$y_p = \sum_{i=0}^{2} \left[\binom{p+i}{2i+1} \delta^{2i} y_1 - \binom{p+i-1}{2i+1} \delta^{2i} y_0 \right]$$

$$= \binom{p}{1} y_1 - \binom{p-1}{1} y_0$$

$$+ \binom{p+1}{3} \delta^2 y_1 - \binom{p}{3} \delta^2 y_0$$

$$+ \binom{p+2}{5} \delta^4 y_1 - \binom{p+1}{5} \delta^4 y_0$$

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$$\binom{P}{1} = \frac{P!}{1!\,(P-1)!} = \frac{P}{1!}$$

$$\binom{P-1}{1} = \frac{(P-1)!}{1!\,(P-2)!} = \frac{P-1}{1!}$$

$$\binom{P+1}{3} = \frac{(P+1)!}{3!\,(P-2)!} = \frac{(P+1)\,P\,(P-1)}{3!}$$

$$\binom{P}{3} = \frac{P!}{3!\,(P-3)!} = \frac{P(P-1)(P-2)}{3!}$$

$$\binom{P+2}{5} = \frac{(P+2)!}{5!\,(P-3)!} = \frac{(P+2)(P+1)\,P\,(P-1)(P-2)}{5!}$$

$$\binom{P+1}{5} = \frac{(P+1)!}{5!\,(P-4)!} = \frac{(P+1)\,P\,(P-1)(P-2)(P-3)}{5!}$$

$$y_p = \frac{P}{1!} y_1 - \frac{P-1}{1!} y_0$$

$$+ \frac{(P+1)P(P-1)}{3!} \delta^2 y_1 - \frac{P(P-1)(P-2)}{3!} \delta^2 y_0$$

$$+ \frac{(P+2)(P+1)P(P-1)(P-2)}{5!} \delta^4 y_1$$

$$- \frac{(P+1)P(P-1)(P-2)(P-3)}{5!} \delta^4 y_0$$

$$y_p = 0.75 * 2.5314789 - (-0.25)\, 2.5185139$$

$$+ \frac{1.75 * 0.75 * (-0.25)}{6} (-0.0003759)$$

$$- \frac{0.75 * (-0.25) * (-1.25)}{6} (-0.0003989)$$

$$+ \frac{2.75 * 1.75 * 0.75 * (-0.25) * (-1.25)}{120} (-0.0000017)$$

$$- \frac{1.75 * 0.75 * (-0.25) * (-1.25) * (-2.25)}{120} (-0.0000025)$$

$$y_p = 1.898609175 + 0.629628475$$

$$+ 0.000020557 + 0.000015582$$

$$+ 0.0000000015979 - 0.0000000019226$$

$$= 2.528273754$$