Reading: Friedland 13 (Berquist-Sherman Methods)
Model: Interpolation
Problem Type: Reserving Methods - PBS (Paid Berq-Sherm) - Interpolation Step

F-13 (022) PBS Interpolation (Problem 1)

Find Use both linear interpolation and exponential regression to restate the cumulative paid losses.

Given

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AY	Cumulative Paid Counts **(CPC)** 12	24	36	48
2022	120	219	255	276
2023	144	240	300	
2024	150	285		
2025	165			

AY	Restated Cumulative Paid Counts **(CPC)** 12	24	36	48
2022	110	204	250	276
2023	132	244	300	
2024	154	285		
2025	165			

AY	Cumulative Paid Loss ($000s) **(CPL)** 12	24	36	48
2022	600	1,050	1,350	1,560
2023	750	1,200	1,650	
2024	720	1,260		
2025	930			

AY	Restated Cumulative Paid Losses **(CPL)** 12	24	36	48
2022	?	?	?	?
2023	?	?	?	
2024	?	?		
2025	?			

	parameters for 2-point exponential fit: $y = ae^{bx}$									
	0 - 12		12 - 24		24 - 36		36 - 48		48 - 60	
AY	a	b	a	b	a	b	a	b	a	b
2022	use 12 - 24 values		304	0.00567	228	0.00701	233	0.00691	not needed	
2023	use 12 - 24 values		371	0.00491	336	0.00532				
2024	use 12 - 24 values		387	0.00415						
2025	use 12 - 24 values									

Ranges *This "range" table is just a visual aid showing where the restated counts fall in relation to the original counts.*

AY	Range Relative to Original Paid Counts 12	24	36	48
2022	0-12	12-24	24-36	48-60
2023	0-12	24-36	36-48	
2024	12-24	24-36		
2025	12-24			

Solution restate CPL using linear interpolation

AY	Restated Cumulative Paid Loss (CPL) 12	24	36	48
2022	550	982	1,308	1,560
2023	688	1,230	1,650	
2024	736	1,260		
2025	930			

2022	550	= (110-0)/(120-0)x(600-0)+0
	982	= (204-120)/(219-120)x(1050-600)+600
	1,308	= (250-219)/(255-219)x(1350-1050)+1050
	1,560	= no change from original
2023	688	= (132-0)/(144-0)x(750-0)+0
	1,230	= (244-240)/(300-240)x(1650-1200)+1200
	1,650	= no change from original
2024	736	= (154-150)/(285-150)x(1260-720)+720
	1,260	= no change from original
2025	930	= no change from original

or... restate CPL using exponential regression interpolation

AY	Restated Cumulative Paid Loss (CPL) 12	24	36	48
2022	567	967	1,315	1,560
2023	709	1,231	1,650	
2024	733	1,260		
2025	930			

2022	567	= 304 x EXP(0.00567 x 110)
	967	= 304 x EXP(0.00567 x 204)
	1,315	= 228 x EXP(0.00701 x 250)
	1,560	= no change from original
2023	709	= 371 x EXP(0.00491 x 132)
	1,231	= 336 x EXP(0.00532 x 244)
	1,650	= no change from original
2024	733	= 387 x EXP(0.00415 x 154)
	1,260	= no change from original
2025	930	= no change from original

Reading: Friedland 13 (Berquist-Sherman Methods) F-13 (022) PBS Interpolation (Problem 2)
Model: Interpolation
Problem Type: Reserving Methods - PBS (Paid Berq-Sherm) - Interpolation Step

Find Use both linear interpolation and exponential regression to restate the cumulative paid losses.

Given

	Cumulative Paid Counts **(CPC)**			
AY	12	24	36	48
2022	83	98	114	115
2023	80	111	118	
2024	75	99		
2025	82			

	Restated Cumulative Paid Counts **(CPC)**			
AY	12	24	36	48
2022	82	99	118	115
2023	82	99	118	
2024	82	99		
2025	82			

	Cumulative Paid Loss ($000s) **(CPL)**			
AY	12	24	36	48
2022	560	1,325	1,650	1,680
2023	650	1,350	1,720	
2024	615	1,305		
2025	625			

	Restated Cumulative Paid Losses **(CPL)**			
AY	12	24	36	48
2022	?	?	?	?
2023	?	?	?	
2024	?	?		
2025	?			

	parameters for 2-point exponential fit: $y = ae^{bx}$									
	0 - 12		12 - 24		24 - 36		36 - 48		48 - 60	
AY	a	b	a	b	a	b	a	b	a	b
2022	use 12 - 24 values		5	0.05910	346	0.01380	212	0.01818	not needed	
2023	use 12 - 24 values		99	0.02386	29	0.03521				
2024	use 12 - 24 values		59	0.03184						
2025	use 12 - 24 values									

Ranges *This "range" table is just a visual aid showing where the restated counts fall in relation to the original counts.*

AY	Range Relative to Original Paid Counts 12	24	36	48
2022	0-12	24-36	48-60	48-60
2023	12-24	12-24	36-48	
2024	12-24	24-36		
2025	12-24			

Solution restate CPL using linear interpolation

AY	Restated Cumulative Paid Loss (CPL) 12	24	36	48
2022	553	1,345	1,770	1,680
2023	695	1,079	1,720	
2024	816	1,305		
2025	625			

2022	553	= (82-0)/(83-0)x(560-0)+0
	1,345	= (99-98)/(114-98)x(1650-1325)+1325
	1,770	= (118-114)/(115-114)x(1680-1650)+1650
	1,680	= *no change from original*
2023	695	= (82-80)/(111-80)x(1350-650)+650
	1,079	= (99-80)/(111-80)x(1350-650)+650
	1,720	= *no change from original*
2024	816	= (82-75)/(99-75)x(1305-615)+615
	1,305	= *no change from original*
2025	625	= *no change from original*

or... restate CPL using exponential regression interpolation

AY	Restated Cumulative Paid Loss (CPL) 12	24	36	48
2022	636	1,356	1,811	1,680
2023	700	1,051	1,720	
2024	803	1,305		
2025	625			

2022	636	= 5 x EXP(0.0591 x 82)
	1,356	= 346 x EXP(0.0138 x 99)
	1,811	= 212 x EXP(0.01818 x 118)
	1,680	= *no change from original*
2023	700	= 99 x EXP(0.02386 x 82)
	1,051	= 99 x EXP(0.02386 x 99)
	1,720	= *no change from original*
2024	803	= 59 x EXP(0.03184 x 82)
	1,305	= *no change from original*
2025	625	= *no change from original*