Paper: Problem: Problem Type:	CCIR.ARinstr calculate (A,B,C, 2018.Fall #16	.D,E,F,G,H,J,K) - there is no "I"	(Alpha	bet City (N	1odel 18.F Q16))	01 a-Question
Balance	Page 20.10 Asse	a t	2017	2016		
Sheet	recoverable from		2017	2010		
Uncer	UEP		n/a	1,040	<== ceded values	
	UCAE		A	1,340	<== ceded values	
	total investment	ts including cash	47,300	43,800		
		0		, , , , , , , , , , , , , , , , , , ,		
	Page 20.20 Liab	ilities & Equity	2017	2016		
	UEP		J	5,200	<== gross values	
	UCAE		В	6,700	<== gross values	
			· · · ·			
Income		ement of Income	2017	2016		
Statement	NWP		28,000	23,400		
	NEP		26,300	n/a		
		adjustment expenses	С	n/a		
		IARE of claims & adj exps	D	n/a		
		justment expenses	E	n/a		
	NET investment	income	3,200	n/a		
			<u> </u>			
Runoff		Clms & Adj Exps Runoff	AV 2016	AV 2017	AY 2017	
0		ofwaar	AY 2016	AY 2017	& prior	
20		of year	2,100			
		of year	2,500	1		
20		ng year	F	n/a	n/a	
		of year	1,400	n/a n/a	3,700	
		of year me from UCAE & IBNR	1,900 G	n/a	K	
		ss/deficiency	n/a			
		ss/deficiency	Н			
		ssy degrerency				
Bond	rating c	lass book val. mkt. val.	duration	yield		
Portfolio	govt HTM	1 6,000 6,600	0.7	1.2%		
	AAA HTM	1 14,000 15,680	8.0	2.9%		
	A HTM	1 7,000 8,400	2.0	7.0%		
Triangle	GROSS paid loss		GROSS unpa			
Data	AY	12 24	AY	12	24	
	2016	1,500 4,400	2016	n/a	5,000	
	2017	1,700	2017	6,800		
Paymont	Voor 1	.0% MfADs	MfAD (claim	oc):	6.00%	
Payment Pattern		30% WIADS	MfAD (re):	15].	6.00%	
(incremental)		50%	MfAD (inv):		1.50%	
(inclusion cincinculy	, car 5				are RETENTION ==>	80%

* reinsurance quota-share RETENTION ==>

Step 1:	calculate the	discount ra	nte as a weigl	hted avera	ge of the yield	s in the bon	d portfolio			
	weight *	yield		* weight =	(book value)	x duration				
	3,960	1.2%	-							
	112,000	2.9%								
	14,000	7.0%								
	,		<== discour	nt rate						
Step 2a:	calculate the	<u>gross</u> PV fo	or AY 2017 an	d AY 2016	(<u>gross</u> of quo	ta-share rei	<i>nsurance)</i> at		<u>3.29%</u>	
	AY 2017:	unpaid	=	6,800	(at 12 mont	hs)				
		PV ₁₇	=	30%	/	80%	x	6,800	/	1.0329 ^ 0.5
			+	50%		80%	x	6,800	. /	1.0329 ^ 1.5
			=	2,509	+	4,049	X	0,000	/	1.0525 1.5
			=	<u>6,558</u>		4,045				
			-	0,550						
	AY 2016:	unpaid	=	5,000	(at 24 mont	hs)				
		PV_{16}	=	50%	/	50%	x	5,000	/	1.0329 ^ 0.5
		10	=	4,920				-,	,	
				4,520						
	==>	gross	PV for both A	AYs at:	3.29%	is	11,477			
		8					,			
Step 2b:	calculate the	<u>gross</u> PV fo	or AY 2017 an	id AY 2016	(<u>gross</u> of quo	ta-share rei	<i>nsurance)</i> at		<u>1.79%</u>	
	==>	gross	PV for both A	AYs at:	1.79%	is	11,622	(similar ca	lculation to	Step 1)
		0					,	·		
										_
Step 3a:	gross APV	=	11,622	+	6.00%	х	11,477	=	12,310	
Step 3b:	net APV	=	11,622	х	80%					
Jtep 30.	net Al V	+	11,477	x	80%	x	6.00%			
		+	11,477	x	20%	x	6.00%			
		=	9,986	^	2070	^	0.0070			
			5,500							
Step 3c:	ceded APV	=	12,310	-	9,986	=	2,324			
			12,010		5,500		_,			

A & B are very easy:	(<u>B</u> is the n	net claims liability ,	<u>A</u> is the reinsuran	ce recoverable	asset)		
A B	=	2,324 12,310	UCAE recov gross UCAE	verable from re liability	einsurer	(Step 3c) (Step 3a)	
C, D & E are more co	nfusing:						
c	= = =	the GROSS "incom (2017 gross UCAE) B 12,310		claims in 2017 (2016 gross U <i>given info</i> 6,700		as negative + + +	e income) (gross paid in 2017) * from paid triangle 4,600
* (=	10,210				1	
* (gross	paid in 2017) = = =	2016 @ 24 4,400 4,600	- 2016 @ 12 - 1,500	+ +	2017 @ 12 1,700		
D	= =	the CEDED "incom (2017 ceded UCAE		(2016 ceded		ecoverable) +	(ceded paid in 2017) **
	= = =	A 2,324 1,904	-	given info 1,340		+ +	see below 920
* (cedea	paid in 2017) = = =	gross paid in 2017 4,600 <mark>920</mark>	x x	20% 20%			
E	= = =		to claims in 2017 - D - 1,904	(this is also ne	gative inco	ome)	

F is easy: if you know that the year labels in the left column of the table represent Calendar Years and the year labels in the top row represent Accident Years

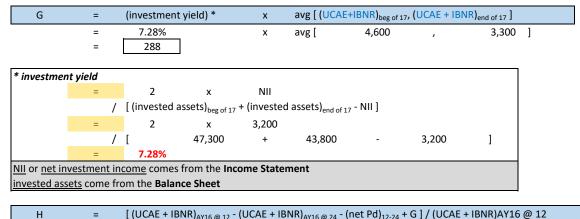
Use the paid loss triangle and the quota-share percentage



G & H are related:

<u>H</u> is the excess (deficiency) ratio and <u>G</u> is the investment income in the excess (deficiency) formula

You might like to review the practice template for the excess (defiency) ratio before proceding! In any case, we first need to calculate G. Note that UCAE + IBNR are directly from the Runoff exhibit in the given info.



```
[ (UCAE + IBNR)<sub>AY16 @ 12</sub> - (UCAE + IBNR)<sub>AY16 @ 24</sub> - (net Pd)<sub>12-24</sub> + G ] / (UCAE + IBNR)AY16 @ 12
=
```

Now:

(UCAE + IBNR) _{AY16 @ 12}	=	2,100	+	2,500	=	4,600
(UCAE + IBNR) _{AY16 @ 24}	=	1,400	+	1,900	=	3,300
(net Pd) ₁₂₋₂₄	=	F			=	2,320

Therefore:

н

-15.9% <== Excess (Deficiency) Ratio

	EP	=	WP	-	chg(UEP)
Appl	y this to our situati	on to obtain	:		
	NEP ₁₇	=	NWP ₁₇	-	[(net UEP) ₁₇ - (net UEP) ₁₆]
	26,300	=	28,000	-	[(net UEP) ₁₇ - ((gross UEP) ₁₆ - (ceded UEP)
Ok, t	his is getting mess	/ so I'm going	g to let you do	the algebr	a. Substitute these values above:
	(gross UEP) ₁	5 =	5,200	<== from	Page 20.20 Balance Sheet
	(ceded UEP) ₁	5 =	1,040	<== from	Page 20.10 Balance Sheet
The r	esult is:				
	(net UEP) ₁	, =	5,860		
And	inally, using the q	uota-share p	ercentage to	GROSS UP 1	his net value, we obtain:
	(gross UEP) ₁	, =	(net UEP) ₁₇	/	80%
	J	=	5,860	/	80%
	J	=	7,325		
K (finally): K is (net IBNR) _{17 & prior} ai	nd the standa	ard formula is	IBNR = (To	tal Liabilities) - Case
(net					
•	BNR) _{17 & prior}	=	(net APV) _{17 8}	prior	- (net Case) _{17 & prior}
	BNR) _{17 & prior}	=	(net APV) _{17 8}	a prior	- (net Case) _{17 & prior}
wl		=	(net APV) _{17 8} 9,986	eprior <== from	
w/	iere			<== from	
// (net / (net /	nere APV) _{17 & prior}	=	9,986	<== from	Step 3b
// (net / (net /	APV) _{17 & prior} Case) _{17 & prior}	=	9,986	<== from	Step 3b
// (net / (net /	nere APV) _{17 & prior} Case) _{17 & prior} efore	= =	9,986 3,700	<== from	Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2017 & prio</u>
w/ (net / (net / <i>ther</i>	nere APV) _{17 & prior} Case) _{17 & prior} efore K	= = =	9,986 3,700 9,986	<== from	Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2017 & prio</u>
w/ (net / (net / <i>ther</i> Solution Summan	nere APV) _{17 & prior} Case) _{17 & prior} efore K	= = =	9,986 3,700 9,986	<== from	Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2017 & prio</u>
w/ (net / (net / <i>ther</i> Solution Summan	APV) _{17 & prior} Case) _{17 & prior} efore K	= = =	9,986 3,700 9,986	<== from <== from -	Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2017 & prio</u> 3,700
w/ (net / (net / <i>ther</i> Solution Summan	APV) _{17 & prior} Case) _{17 & prior} efore K Y:	= = = 2,324	9,986 3,700 9,986	<== from <== from -	Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2017 & prio</u> 3,700 <u>= 2,320</u>
w/ (net / (net / <i>ther</i>	APV) _{17 & prior} Case) _{17 & prior} efore K Y: A = B =	= = = = 2,324 12,310	9,986 3,700 9,986	<== from <== from - - F G	Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2017 & prio</u> 3,700 <u>= 2,320</u> <u>= 288</u>

Paper: Problem: Problem Type	e:	CCIR.ARins calculate (2018.Fall #	A,B,C,D,E,F,C	5,H,J,K) - the	ere is no "I"	(Alpha	bet City (N	1odel 18.F Q1	6)) 02 a-Question
Balance		Page 20.1				2017	2016		
Sheet		recoverab UEP	le from reins	urers:		n /a	1 760	< and ad wal	luce
		UCAE				n/a A	1,760 2,520	<== ceded val <== ceded val	
			tments inclu	ding cash		104,900	76,400	< Ceded Val	ues
		totarmves				104,500	70,400		
		Page 20.2	0 Liabilities 8	& Equity		2017	2016		
		UEP				J	8,800	<== gross valu	les
		UCAE				В	12,600	<== gross valu	ies
						г – т			
Income			0 Statement	of Income		2017	2016		
Statement		NWP NEP				47,000	43,600		
			ims & adjust	ment evnen	505	42,700 C	n/a n/a		
			R'S SHARE of	-		D	n/a		
			s & adjustme			E	n/a		
			ment incom	-	,	4,400	n/a		
				•		.,			
Runoff		Page 60.4	1 Net Clms 8	Adj Exps R	unoff			AY 2017	
	СҮ	Discounte	d			AY 2016	AY 2017	& prior	
	2016	UCAE	end of year			3,800			
		IBNR	end of year			3,900			
	2017	Paid	during yea			F	n/a	n/a	
		UCAE	end of year			2,800	n/a	5,300	
		IBNR	end of year			3,300	n/a	K	
		Amount:	t income fro excess/defi		BINK	G n/a			
		Ratio:	excess/defi	=		Н			
l		natio.		cicility					
Bond		rating	class	book val.	mkt. val.	duration	yield		
Portfolio		govt	HTM	6,000	5,220	1.2	1.3%		
		AAA	HTM	6,000	6,780		2.5%		
		A	HTM	8,000	9,120	4.0	6.7%		
Tuis a sta		CDOSS and				CDOCC	- 1 - 1	l'annual a l'	
Triangle Data		AY	d loss (cumu 12			GROSS unpa	aid loss (<u>un</u> d 12	24	
Data		2016	3,400			2016	n/a	10,500	
		2017	2,700			2017	12,300	10,000	
			_,. 30				-,•		
Payment		year 1	30%		MfADs	MfAD (clain	ns):	4.00%	
Pattern		year 2	10%			MfAD (re):		10.00%	
(incremental)		year 3	60%			MfAD (inv):		1.50%	
						* reinsuran	ce quota-sh	are RETENTION	\ ==> 80%

Step 1:	calculate the	discount ra	te as a weigl	nted averag	ge of the yield	ls in the bon	d portfolio			
	weight *	yield		* weight =	(book value)	x duration				
	7,440	1.3%		_						
	90,000	2.5%								
	32,000	6.7%								
		3.47%	<== discour	nt rate						
	_									
Step 2a:	calculate the	<u>gross</u> PV fo	r AY 2017 an	d AY 2016	(<u>gross</u> of quo	ota-share reii	nsurance) at		<u>3.47%</u>	
	AY 2017:	unpaid	=	12,300	(at 12 mont	:hs)				
		PV ₁₇	=	10%	/	70%	x	12,300	/	1.0347 ^ 0.5
		17	+	60%	,	70%	x	12,300	,	1.0347 ^ 1.5
			=	1,727	+	10,017	~	12,500	,	1.05 17 1.5
			=	<u>11,744</u>	·	10,017				
				<u></u>						
	AY 2016:	unpaid	=	10,500	(at 24 mont	ths)				
		PV_{16}	=	60%	/	60%	x	10,500	/	1.0347 ^ 0.5
		. • 16	=	<u>10,322</u>	1	0070	~	10,500	/	1.0547 0.5
			-	10,322						
	==>	gross	PV for both A	Ys at:	3.47%	is	22,067			
		0								
Step 2b:	calculate the	<u>gross</u> PV fo	r AY 2017 an	d AY 2016	(<u>qross</u> of quo	ota-share reii	<i>nsurance)</i> at		<u>1.97%</u>	
	==>	gross	PV for both A	Ys at:	1 .97%	is	22,377	(similar cald	ulation to	Step 1)
		8.000				10		louine care		0100 2)
								_		_
Step 3a:	gross APV	=	22,377	+	4.00%	х	22,067	=	23,260	
Step 3b:	net APV	=	22,377	х	80%					
		+	22,067	х	80%	х	4.00%			
		+	22,067	х	20%	х	10.00%			
		=	19,049							
Step 3c:	ceded APV	=	23,260		10.040	_	4,211			
Step Sc:	ceueu APV	=	23,200	-	19,049	=	4,211			

	ry easy:	<u>B</u> is the r	et claims liability , <u>A</u> is	the reinsuran	ce recoverable asset)		
	А	=	4,211		verable from reinsurer	· · · /	
	В	=	23,260	gross UCAE	liability	(Step 3a)	
C, D & E are	more confusi	ng:					
	С	=	the GROSS "income" d	lue to GROSS (claims in 2017 <i>(think o</i> j	f it as negativ	e income)
		=	(2017 gross UCAE)	-	(2016 gross UCAE)	+	(gross paid in 2017) *
		=	В	-	given info	+	from paid triangle
		=	23,260	-	12,600	+	8,100
		=	18,760				
	* (gross paid	in 2017)					
		=	2016 @ 24 -	2016 @ 12	+ 2017@	12	
		=	8,800 -	3,400	+ 2,700		
		=	8,100				
	D	=	the CEDED "income" d	lue to CEDED o	claims in 2017 <i>(this is a</i>	recoverable)
		=	(2017 ceded UCAE)	-	(2016 ceded UCAE)	+	(ceded paid in 2017) *
		=	А	-	given info	+	see below
		=	4,211	-	2,520	+	1,620
		=	3,311				
[* (ceded paid	l in 2017)					
		=	gross paid in 2017	х	20%		
		=	8,100	х	20%		
l		=	1,620				
	Е	=	net "income" due to c	laims in 2017	(this is also negative i	ncome)	
		=	C -	D	-		
		=	18,760 -	3,311			
			-,	- /			
		=	15,449				

F is easy: if you know that the year labels in the left column of the table represent Calendar Years and the year labels in the top row represent Accident Years

Use the paid loss triangle and the quota-share percentage



G & H are related:

related: <u>H</u> is the excess (deficiency) ratio and <u>G</u> is the investment income in the excess (deficiency) formula

You might like to review the practice template for the excess (defiency) ratio before proceeding! In any case, we first need to calculate G. Note that UCAE + IBNR are directly from the **Runoff exhibit** in the given info.

G	=		(investment	yield) *	х	avg [(UCAE-	HBNR) beg of 1	<mark>7, (UCAE + IB</mark> N	IR) _{end of 17}]
	=		4.97%		х	avg [7,700	,	6,100
	=		343						
investment	yield								
	=		2	х	NII				
		/	[(invested a	issets) _{beg of 17}	+ (invested	assets) _{end of 17}	, - NII]		
	=		2	х	4,400				
		/	[104,900	+	76,400	-	4,400]
	=		4.97%						
ll or net inv	estmen	t inc	come comes	from the Inc	ome State	ment			
vested asse	ets com	e fro	m the Balan	ce Sheet					

```
= [ (UCAE + IBNR)<sub>AY16 @ 12</sub> - (UCAE + IBNR)<sub>AY16 @ 24</sub> - (net Pd)<sub>12-24</sub> + G ] / (UCAE + IBNR)AY16 @ 12
```

Now:

Н

(UCAE + IBNR) _{AY16 @ 12}	=	3,800	+	3,900	=	7,700
(UCAE + IBNR) _{AY16 @ 24}	=	2,800	+	3,300	=	6,100
(net Pd) ₁₂₋₂₄	=	F			=	4,320

Therefore:

н

=

-30.9% <== Excess (Deficiency) Ratio

Needin the	stanuaru iom						
	EP	=	WP	-	chg(UEP)		
Apply this	to our situatio	on to obtain	:				
	NEP ₁₇	=	NWP ₁₇	-	[(net UEP)	₁₇ - (net UEP) ₁	6]
	42,700	=	47,000	-	[(net UEP)	₁₇ - ((gross UE	P) ₁₆ - (ceded UE
Ok, this is	getting messy	' so I'm going	g to let you do	the algeb	ra. Substitute	these values	above:
	(gross UEP) ₁₆		8,800	-	-	Balance Shee	
	(ceded UEP) ₁₆	=	1,760	<== from	Page 20.10	Balance Shee	t
The result	is:						
	(net UEP) ₁₇	=	11,340				
And finally	y, using the <mark>qu</mark>	iota-share p	ercentage to	GROSS UP	this net value	e, we obtain:	
	(gross UEP) ₁₇	=	(net UEP) ₁₇	/	80%		
	(gross OLF) ₁₇						
	(gross of r) ₁₇	=	11,340	/	80%		
		= =	11,340 14,175	/	80%		
lly): K is (net IE	J J BNR) _{17 & prior} an	=	14,175 ard formula is	IBNR = (Tc			& orior
lly): K is (net IE	J J BNR) _{17 & prior} an	= nd the standa	14,175	IBNR = (Tc	tal Liabilities) - Case (net Case) _{17.}	& prior
	J J BNR) _{17 & prior} an	= nd the standa	14,175 ard formula is	IBNR = (Tc	tal Liabilities		& prior
(net IBNR) where (net APV) ₁	J J BNR) _{17 & prior} an	= nd the standa	14,175 ard formula is	IBNR = (Tc k prior <== from	tal Liabilities	(net Case) ₁₇	<u> </u>
(net IBNR) where	J J BNR) _{17 & prior} an	= nd the standa =	14,175 ard formula is (net APV) _{17 8}	IBNR = (Tc k prior <== from	tal Liabilities	(net Case) ₁₇	& prior E for <u>2017 & pr</u> i
(net IBNR) where (net APV) ₁	J J BNR) _{17 & prior} an <u>17 & prior</u> L7 & prior 17 & prior	= nd the standa = =	14,175 ard formula is (net APV) _{17 8} 19,049	IBNR = (Tc k prior <== from	tal Liabilities	(net Case) ₁₇	<u> </u>
(net IBNR) where (net APV) ₁ (net Case)	J J BNR) _{17 & prior} an <u>17 & prior</u> L7 & prior 17 & prior	= nd the standa = =	14,175 ard formula is (net APV) _{17 8} 19,049	IBNR = (Tc k prior <== from	tal Liabilities	(net Case) ₁₇	<u> </u>
(net IBNR) where (net APV) ₁ (net Case)	J J BNR) _{17 & prior} an <u>17 & prior</u> 17 & prior 17 & prior	= nd the standa = = =	14,175 ard formula is (net APV) _{17 8} 19,049 5,300	IBNR = (Tc k prior <== from	- - - - - - - - - - - - - - - - - - -	(net Case) ₁₇	<u> </u>
(net IBNR) where (net APV) ₁ (net Case)	J J BNR) _{17 & prior} an <u>17 & prior</u> 17 & prior 17 & prior	= nd the standa = = = =	14,175 ard formula is (net APV) _{17 8} 19,049 5,300 19,049	IBNR = (Tc k prior <== from	- - - - - - - - - - - - - - - - - - -	(net Case) ₁₇	<u> </u>
(net IBNR) where (net APV) ₁ (net Case) therefore	J J BNR) _{17 & prior} an <u>17 & prior</u> 17 & prior 17 & prior	= nd the standa = = = =	14,175 ard formula is (net APV) _{17 8} 19,049 5,300 19,049	IBNR = (Tc k prior <== from	- - - - - - - - - - - - - - - - - - -	(net Case) ₁₇	
(net IBNR) where (net APV) ₁ (net Case) therefore	J J BNR) _{17 & prior} an <u>17 & prior</u> 17 & prior 17 & prior 5 K	= nd the standa = = = = =	14,175 ard formula is (net APV) _{17 8} 19,049 5,300 19,049	IBNR = (To prior <== from <== from	step 3b Runoff Exhib	(net Case) ₁₇	
(net IBNR) where (net APV) ₁ (net Case) therefore	J J BNR) _{17 & prior} an <u>17 & prior</u> 17 & prior 17 & prior 5 K	= ad the standa = = = = 4,211 23,260 18,760	14,175 ard formula is (net APV) _{17 8} 19,049 5,300 19,049	IBNR = (To A prior <== from <== from - F G H	step 3b Runoff Exhib	(net Case) ₁₇ bit (<u>2017</u> UCA <u>343</u> -30.9%	
(net IBNR) where (net APV) ₁ (net Case) therefore	J J BNR) _{17 & prior} an 17 & prior 17 & prior 17 & prior 20 K	= id the standa = = = = 4,211 23,260	14,175 ard formula is (net APV) _{17 8} 19,049 5,300 19,049	IBNR = (To prior <== from <== from - F G	stal Liabilities	(net Case) ₁₇ bit (<u>2017</u> UCA 4,320 <u>343</u>	

Paper: Problem: Problem Type:	CCIR.ARinstr calculate (A,B,C,D,E,F,G,H,J,K) - there is no "I" 2018.Fall #16	(Alphabet City (Model 18.F Q16)) 03 a-Question
Balance	Page 20.10 Asset	2017 2016
Sheet	recoverable from reinsurers:	
	UEP	n/a 1,440 <== ceded values
	UCAE	A 2,880 <== ceded values
	total investments including cash	66,300 56,700
		·
	Page 20.20 Liabilities & Equity	2017 2016
	UEP	J 4,800 <== gross values
	UCAE	B 9,600 <== gross values
Income	Page 20.30 Statement of Income	2017 2016
Statement	NWP	31,000 28,500
	NEP	27,600 n/a
	GROSS claims & adjustment expenses	C n/a
	REINSURER'S SHARE of claims & adj exps	D n/a
	NET claims & adjustment expenses	E n/a
	NET investment income	3,500 n/a
Duraff	Dage CO 41 Net Class & Adi Funa Dur off	AY 2017
Runoff CY	Page 60.41 Net Clms & Adj Exps Runoff Discounted	AY 2016 AY 2017 & prior
2016		2,500
2010	IBNR end of year	2,900
2017	-	F n/a n/a
2017	UCAE end of year	1,600 n/a 3,800
	IBNR end of year	2,100 n/a K
	investment income from UCAE & IBNR	G
	Amount: excess/deficiency	n/a
	Ratio: excess/deficiency	Н
	, , , ,	
Bond	rating class book val. mkt. val.	duration yield
Portfolio	govt HTM 2,000 2,300	1.9 1.1%
	AAA HTM 12,000 11,160	8.0 3.3%
	A HTM 13,000 14,950	1.0 6.0%
Triangle	GROSS paid loss (cumulative)	GROSS unpaid loss (<u>un</u> discounted)
Data	AY 12 24	AY 12 24
	2016 2,200 5,700	2016 n/a 5,000
	2017 2,300	2017 7,000
Payment	year 1 20% MfADs	MfAD (claims): 8.00%
Pattern	year 2 30%	MfAD (re): 3.00%
(incremental)	year 3 50%	MfAD (inv): 2.00%
	,	* reinsurance quota-share RETENTION ==> 70%

* reinsurance quota-share RETENTION ==>

Jtep 1.	calculate the				ge of the yield	is in the bon				
	weight *	yield		* weight =	(book value)	x duration				
	3,760	. 1.1%	•	Ŭ						
	96,000	3.3%								
	13,000	6.0%								
		3.54%	<== discour	nt rate						
Step 2a:	calculate the	e <u>gross</u> PV fo	or AY 2017 an	id AY 2016	(<u>gross</u> of quo	ota-share rei	nsurance) at		<u>3.54%</u>	
	AY 2017:	ام محمد ب	_	7 000	(at 12 m a at	4.0				
	AY 2017:	unpaid	=	7,000	(at 12 mont	nsj				
		PV ₁₇	=	30%	/	80%	x	7,000	/	1.0354 ^ 0.5
		••1/	+	50%	/	80%	x	7,000	/	1.0354 ^ 1.5
			=	2,580	/ +	4,153	^	7,000	/	1.0354 1.5
				<u>6,732</u>		4,155				
				<u></u>						
	AY 2016:	unpaid	=	5,000	(at 24 mont	hs)				
		·								
		PV ₁₆	=	50%	/	50%	х	5,000	/	1.0354 ^ 0.5
			=	4,914						
	==>	gross	PV for both A	AYs at:	3.54%	is	11,646			
Step 2b:	calculate the	gross PV fo	or AY 2017 an	d AY 2016	(<u>gross</u> of quo	ota-share rei	<i>nsurance)</i> at		<u>1.54%</u>	
	==>	gross	PV for both A	AYs at:	1.54%	is	11,843	(similar ca	lculation to	Step 1)
Stop 201	gross APV	=	11,843		8.00%		11,646	_	12,774	
Step 3a:	gross APV	-	11,045	+	8.00%	х	11,040	=	12,774	
Step 3b:	net APV	=	11,843	x	70%					
Step 35.	net Al V	+	11,646	x	70%	x	8.00%			
		+	11,646	x	30%	x	3.00%			
		=	9,047	~	00/0	~	0100/0			
				I						
Step 3c:	ceded APV	=	12,774	-	9,047	=	3,728			
	- '									

Step 1: calculate the discount rate as a weighted average of the yields in the bond portfolio

	<u>is the r</u>	net claims liability , <u>A</u> is	the reinsuran	ce recoverable asset)		
AB	= =	3,728 12,774	UCAE recov gross UCAE	verable from reinsurer	(Step 3c) (Step 3a)	
b	-	12,774	gi USS UCAL	lability	(Step Sa)	
C, D & E are more confusin	g:					
С	=	the GROSS "income" d	ue to GROSS	claims in 2017 (think of	fitas negativ	e income)
	=	(2017 gross UCAE)	-	(2016 gross UCAE)	+	(gross paid in 2017) *
	=	В	-	given info	+	from paid triangle
	=	12,774	-	9,600	+	5,800
	=	8,974				·
* (gross paid i	n 2017)					
	=	2016 @ 24 -	2016 @ 12	+ 2017@3	12	
	=	5,700 -	2,200	+ 2,300		
	=	5,800	,	,		
D	= =	the CEDED "income" d (2017 ceded UCAE)	ue to CEDED	(2016 ceded UCAE)	recoverable +	(ceded paid in 2017) **
	=	A	-	given info	+	see below
	=	3,728	-	2,880	+	1,740
						_,,
	=	2,588				_,
* (ceded paid						_,
* (ceded paid			x	30%		_,
* (ceded paid	in 2017)		x x			_,
* (ceded paid	in 2017) =	gross paid in 2017		30%		_,
* (ceded poid	in 2017) = =	gross paid in 2017 5,800	х	30% 30%		
	in 2017) = = =	gross paid in 2017 5,800 1,740	х	30% 30%		-,
	in 2017) = = = =	gross paid in 2017 5,800 1,740 net "income" due to cl C -	x laims in 2017 D	30% 30%		_,
	in 2017) = = = = =	gross paid in 2017 5,800 1,740 net "income" due to cl	x laims in 2017	30% 30%		_,

F is easy: if you know that the year labels in the left column of the table represent Calendar Years and the year labels in the top row represent Accident Years

Use the paid loss triangle and the quota-share percentage



G & H are related:

related: <u>H</u> is the excess (deficiency) ratio and <u>G</u> is the investment income in the excess (deficiency) formula

You might like to review the practice template for the excess (defiency) ratio before proceeding! In any case, we first need to calculate G. Note that UCAE + IBNR are directly from the **Runoff exhibit** in the given info.

		(investment	yield) *	х	avg [(UCAE	FIBINR) beg of 17	7, (UCAE + IBN	R)end of 17
	=	5.86%		х	avg [5,400	,	3,700
	=	267						
* investment y	ield							
	=	2	х	NII				
		/ [(invested a	ssets) _{beg of 17}	+ (invested	assets) _{end of 1}	7 - NII]		
	=	2	х	3,500				
		/ [66,300	+	56,700	-	3,500]
	=	5.86%						
NII or <u>net inves</u>	tment	income comes	from the Inc	ome Stater	nent			
nvested assets	come	from the Balan	ce Sheet					

= [(UCAE + IBNR)_{AY16 @ 12} - (UCAE + IBNR)_{AY16 @ 24} - (net Pd)₁₂₋₂₄ + G] / (UCAE + IBNR)AY16 @ 12

Now:

Н

(UCAE + IBNR) _{AY16 @ 12}	=	2,500	+	2,900	=	5,400
(UCAE + IBNR) _{AY16 @ 24}	=	1,600	+	2,100	=	3,700
(net Pd) ₁₂₋₂₄	=	F			=	2,450

Therefore:

н

= -9.0% <== Excess (Deficiency) Ratio

	EP	=	WP	-	chg(UEP)	
Apply th	his to our situatio	n to obtain:	:			
	NEP ₁₇	=	NWP ₁₇	-	[(net UEP) ₁₇ - (net UEP) ₁₆]	
	27,600	=	31,000	-	[(net UEP) ₁₇ - ((gross UEP) ₁₆ - (d	ceded UEP) ₁₀
Ok, this	is getting messy	so I'm going	g to let you do	the algeb	a. Substitute these values above:	
	(gross UEP) ₁₆	=	4,800	<== from	Page 20.20 Balance Sheet	
	(ceded UEP) ₁₆	=	1,440	<== from	Page 20.10 Balance Sheet	
The res	ult is:					
	(net UEP) ₁₇	=	6,760			
And fina	ally, using the qu e	ota-share p	ercentage to	GROSS UP	this net value, we obtain:	
	(gross UEP) ₁₇	=	(net UEP) ₁₇	/	70%	
	J	=	6,760	/	70%	
	J	=	9,657			
					tal Liabilities) - Case	
	t IBNR) _{17 & prior} and NR) _{17 & prior}	d the standa =	ard formula is (net APV) _{17 8}		tal Liabilities) - Case - (net Case) _{17 & prior}	
	NR) _{17 & prior}					
(net IBN wher (net AP'	IR) _{17 & prior} e V) _{17 & prior}			e prior <== fron	- (net Case) _{17 & prior}	
(net IBN wher (net AP'	R) _{17 & prior}	=	(net APV) _{17 8}	e prior <== fron	- (net Case) _{17 & prior}	017 & prior
(net IBN wher (net AP'	IR) _{17 & prior} e V) _{17 & prior} 5e) _{17 & prior}	=	(net APV) _{17 8} 9,047	e prior <== fron	- (net Case) _{17 & prior}	017 & prior
(net IBN wher (net AP ⁾ (net Cas	IR) _{17 & prior} e V) _{17 & prior} 5e) _{17 & prior}	=	(net APV) _{17 8} 9,047	e prior <== fron	- (net Case) _{17 & prior}	017 & prior
(net IBN wher (net AP ⁾ (net Cas	IR) _{17 & prior} e V) _{17 & prior} 5e) _{17 & prior} Dre	= = =	(net APV) ₁₇₈ 9,047 3,800	e prior <== fron	- (net Case) _{17 & prior} Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2</u>	017 & prior
(net IBN wher (net AP ⁾ (net Cas	IR) _{17 & prior} e V) _{17 & prior} 5e) _{17 & prior} Dre	=	(net APV) _{17 8} 9,047 3,800 9,047	e prior <== fron	- (net Case) _{17 & prior} Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2</u>	017 & prior
(net IBN when (net AP (net Cas therefo	IR) _{17 & prior} e V) _{17 & prior} 5e) _{17 & prior} Dre	=	(net APV) _{17 8} 9,047 3,800 9,047	e prior <== fron	- (net Case) _{17 & prior} Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2</u>	017 & prior
(net IBN wher (net AP' (net Cas therefor lution Summary:	IR) _{17 & prior} e V) _{17 & prior} se) _{17 & prior} ore K	= = = = 3,728 12,774	(net APV) _{17 8} 9,047 3,800 9,047	<pre>> prior <== from <== from - F G</pre>	 (net Case)_{17 & prior} Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2</u> 3,800 = 2,450 = 267 	017 & prior
(net IBN wher (net AP' (net Cas therefor lution Summary: A B C	JR) _{17 & prior} e V) _{17 & prior} se) _{17 & prior} Se) _{17 & prior} Dre K	= = = = 3,728 12,774 8,974	(net APV) _{17 8} 9,047 3,800 9,047	<pre>> prior <== from <== from - F G H</pre>	 (net Case)_{17 & prior} Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2</u> 3,800 = 2,450 = 267 = -9.0% 	017 & prior
(net IBN wher (net AP' (net Cas therefor lution Summary:	IR) _{17 & prior} e V) _{17 & prior} se) _{17 & prior} se) _{17 & prior} Dre K	= = = = 3,728 12,774	(net APV) _{17 8} 9,047 3,800 9,047	<pre>> prior <== from <== from - F G</pre>	 (net Case)_{17 & prior} Step 3b Runoff Exhibit (<u>2017</u> UCAE for <u>2</u> 3,800 = 2,450 = 267 	017 & prior

Paper: Problem: Problem Type:	CCIR.Al calcula 2018.Fa	te (A,B,C,D,E,F,	G,H,J,K) - the	re is no "I"	(Alpha	bet City (N	1odel 18.F Q16)) 04 a-Question
Balance	Page 2	0.10 Asset			2017	2016		
Sheet		rable from reins	surers:		2017	2010		
	UEP				n/a	1,600	<== ceded value	25
	UCA	<u> </u>			A	2,480		es
	total in	vestments inclu	uding cash		42,700	30,500		
	Page 2	0.20 Liabilities	& Equity		2017	2016		
	UEP				J	4,000	<== gross value	S
	UCAE				В	6,200	<== gross value	S
	-		•		,			
Income		0.30 Statement	of Income		2017	2016		
Statement	NWP				23,000	25,700		
	NEP				23,200	n/a		
		claims & adjust	=		C	n/a		
		RER'S SHARE o			D	n/a		
		ims & adjustme restment incom	-	5	E	n/a		
	INET INV	restment incom	ie		2,200	n/a		
Runoff	Page 6).41 Net Clms &	& Adi Exps R	unoff			AY 2017	
	Y Discou				AY 2016	AY 2017	& prior	
	16 UCA		r		1,900			
	IBN	-			1,900			
20	17 Paic				F	n/a	n/a	
	UCA				1,200	n/a	2,600	
	IBN				1,900	n/a	К	
	investn	nent income fro	om UCAE & II	BNR	G			
	Amoun	t: excess/def	iciency		n/a			
	Ratio:	excess/def	iciency		Н			
Bond	ratin	-	book val.	mkt. val.	duration	yield		
Portfolio	govt	HTM	6,000	5,520		1.3%		
	AAA	HTM	1,000	870		3.6%		
	A	HTM	13,000	14,040	1.0	6.5%		
Triangle	GROSS	paid loss (cum	ulative)		GROSS unp	aid loss (und	discounted)	
Data	AY	12			AY	12	24	
	201				2016	n/a	5,100	
	201				2017	5,100		
Payment	year	1 10%		MfADs	MfAD (clain	ns):	13.00%	
Pattern	year				MfAD (re):		4.00%	
(incremental)	year	3 70%			MfAD (inv):		0.50%	
					* reinsuran	ce quota-sh	are RETENTION =	=> 60%

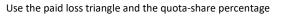
* reinsurance quota-share RETENTION ==>

			0				·			
	weight *	yield		* weight =	(book value)	x duration				
	10,620	1.3%								
	13,000	3.6%								
	13,000	6.5%								
			<== discour	nt rate						
Step 2a:	calculate the	gross PV fo	or AY 2017 an	d AY 2016	(<u>qross</u> of quo	ta-share rei	nsurance) at		<u>3.96%</u>	
	AY 2017:	unpaid	=	5,100	(at 12 mont	hs)				
		PV ₁₇	=	20%	/	90%	x	5,100	/	1.0396 ^ 0.5
			+	70%	/	90%	х	5,100	/	1.0396 ^ 1.5
			=	1,112	+	3,742		,	•	
			=	4,854		- /				
	AY 2016:	unpaid	=	5,100	(at 24 mont	hs)				
		anpara		0,200	(012)					
		PV_{16}	=	70%	/	70%	x	5,100	/	1.0396 ^ 0.5
		16			/	7070	~	5,100	/	1.0350 0.5
			=	<u>5,002</u>						
	>	aross	PV for both A	Vc at:	3.96%	is	9,856			
	==>	gross		ATS dl.	3.90%	15	9,000			
Step 2b:	calculate the	gross DV fo	vr AV 2017 an	d AV 2016	(<u>gross</u> of quo	ta-chara rai	nsurance) at		3.46%	
Step 20.		<u>giuss</u> r v iu	1 AT 2017 an	IU AT 2010	(<u>qross</u> oj quo	lu-shule len	iisuiuiice) at		3.40/0	
	==>	aross	PV for both A	Vc at:	3.46%	is	9,898	(similar cal	lculation to	Stop 1)
	/	gross		ATS dl.	3.40%	15	9,090	(sinniur cui		Step 1)
Cham Day		_	0.000		12.000/		0.050	_	11 170	
Step 3a:	gross APV	=	9,898	+	13.00%	х	9,856	=	11,179	
Step 3b:	net APV	=	9,898	x	60%					
Step Su.	liet AFV						12 00%			
		+	9,856	x	60%	x	13.00%			
		+	9,856	х	40%	х	4.00%			
		=	6,865							
								1		
Step 3c:	ceded APV	=	11,179	-	6,865	=	4,314			

Step 1: calculate the discount rate as a weighted average of the yields in the bond portfolio

	$\frac{1}{2}$ is the net claims ilability	, <u>A</u> is the reinsurand	ce recoverable asset)		
А	= 4,314	UCAE recov	erable from reinsurer	(Step 3c)	
В	= 11,179	gross UCAE	liability	(Step 3a)	
C, D & E are more confusing	g:				
С	= the GROSS "inco	ome" due to GROSS o	claims in 2017 <i>(think of i</i> i	t as negativ e	e income)
	= (2017 gross UCA	.E) -	(2016 gross UCAE)	+	(gross paid in 2017) *
	= B	-	given info	+	from paid triangle
	= 11,179	-	6,200	+	4,300
	= 9,279				
* (gross paid in	n 2017)			1	
	= 2016 @ 24	- 2016@12	+ 2017@12		
	= 4,200	- 1,600	+ 1,700		
	= 4,300	,	,		
D	 the CEDED "inco (2017 ceded UC) A 4,314 3,554 		claims in 2017 (this is a r (2016 ceded UCAE) <i>given info</i> 2,480	recoverable) + + +) (ceded paid in 2017) ** <i>see below</i> 1,720
* (ceded paid ir	in 2017)			1	
	= gross paid in 2017	, x	40%		
	= 4,300	х	40%		
	= 1,720				
	= net "income" du	ie to claims in 2017 ((this is also negative inc	come)	
E	- net meonie du				
E	= C	- D			
E		- D - 3,554			

F is easy: if you know that the year labels in the left column of the table represent Calendar Years and the year labels in the top row represent Accident Years





G & H are related:

related: <u>H</u> is the excess (deficiency) ratio and <u>G</u> is the investment income in the excess (deficiency) formula

You might like to review the practice template for the excess (defiency) ratio before proceeding! In any case, we first need to calculate G. Note that UCAE + IBNR are directly from the **Runoff exhibit** in the given info.

G	=	(investment	yield) *	х	avg [(UCAE-	+IBNR) _{beg of 1}	7, (UCAE + IBN	IR) _{end of 17}]
	=	6.20%		х	avg [3,800	,	3,100
	=	214						
* investment	yield							
	=	2	х	NII				
	/	[(invested a	ssets) _{beg of 17}	+ (invested	assets) _{end of 17}	7 - NII]		
	=	2	х	2,200				
	/	[42,700	+	30,500	-	2,200]
	=	6.20%						
<u>VII</u> or <u>net inv</u>	estment ir	ncome comes	from the Inc	ome Stater	nent			
nvested asse	ets come fr	om the Balan	ce Sheet					

= [(UCAE + IBNR)_{AY16 @ 12} - (UCAE + IBNR)_{AY16 @ 24} - (net Pd)₁₂₋₂₄ + G] / (UCAE + IBNR)AY16 @ 12

Now:

Н

(UCAE + IBNR) _{AY16 @ 12}	=	1,900	+	1,900	=	3,800
(UCAE + IBNR) _{AY16 @ 24}	=	1,200	+	1,900	=	3,100
(net Pd) ₁₂₋₂₄	=	F			=	1,560

Therefore:

н

=

-17.0% <== Excess (Deficiency) Ratio

	EP	=	WP	-	chg(UEP)	
Apply this	to our situatio	n to obtain	:			
	NEP ₁₇	=	NWP ₁₇	-	[(net UEP) ₁₇ - (net UEP) ₁₆]
	23,200	=	23,000	-	[(net UEP) ₁₇ - ((gross L	IEP) ₁₆ - (ceded UEP) ₁₆)
Ok, this is a	getting messy	so I'm going	g to let you do	the algeb	a. Substitute these value	s above:
	(gross UEP) ₁₆	=	4,000	<== from	Page 20.20 Balance She	et
(ceded UEP) ₁₆	=	1,600	<== from	Page 20.10 Balance She	et
The result	is:					
	(net UEP) ₁₇	=	2,200			
And finally	, using the qu	ota-share p	ercentage to	GROSS UP	his net value, we obtain:	
	(gross UEP) ₁₇	=	(net UEP) ₁₇	/	60%	
	J	=	2,200	/	60%	
	J	=	3,667			
(finally): K is (net IB						
	NR) _{17 & prior} and	I the standa	ard formula is	IBNR = (To	tal Liabilities) - Case	
(net IBNR)		l the standa	ard formula is (net APV) _{17 8}		tal Liabilities) - Case - (net Case) ₁	7 & prior
						7 & prior
(net IBNR)) where	17 & prior	=	(net APV) _{17 8}	k prior	- (net Case) ₁	7 & prior
(net IBNR)) where (net APV) ₁	17 & prior		(net APV) _{17 8} 6,865	k prior <== from	- (net Case) ₁	<u> </u>
(net IBNR)) where (net APV) ₁ (net Case) ₁	17 & prior 7 & prior 17 & prior	=	(net APV) _{17 8}	k prior <== from	- (net Case) ₁ Step 3b	<u> </u>
(net IBNR)) where (net APV) ₁	17 & prior 7 & prior 17 & prior	=	(net APV) _{17 8} 6,865	k prior <== from	- (net Case) ₁ Step 3b	<u> </u>
(net IBNR)) where (net APV) ₁ (net Case) ₁	17 & prior 7 & prior 17 & prior	=	(net APV) _{17 8} 6,865	k prior <== from	- (net Case) ₁ Step 3b	<u> </u>
(net IBNR)) where (net APV) ₁ (net Case) ₁	17 & prior 7 & prior 17 & prior	= = =	(net APV) _{17 8} 6,865 2,600	k prior <== from	- (net Case) ₁ Step 3b Runoff Exhibit (<u>2017</u> UC	<u> </u>
(net IBNR)) where (net APV) ₁ (net Case) ₁	17 & prior 7 & prior 17 & prior	= = =	(net APV) _{17 8} 6,865 2,600 6,865	k prior <== from	- (net Case) ₁ Step 3b Runoff Exhibit (<u>2017</u> UC	<u> </u>
(net IBNR)) where (net APV) ₁ (net Case) ₁ therefore	17 & prior 7 & prior 17 & prior	= = =	(net APV) _{17 8} 6,865 2,600 6,865	k prior <== from	- (net Case) ₁ Step 3b Runoff Exhibit (<u>2017</u> UC	<u> </u>
(net IBNR) where (net APV) ₁ (net Case) therefore	17 & prior 7 & prior 17 & prior K	= = =	(net APV) _{17 8} 6,865 2,600 6,865	<pre>c prior <pre>c == from <pre>c == from </pre></pre></pre>	- (net Case) ₁ Step 3b Runoff Exhibit (<u>2017</u> UC 2,600	<u> </u>
(net IBNR) where (net APV) ₁ (net Case) ₁ therefore	17 & prior 7 & prior 17 & prior 17 & prior K K = = = =	= = = = 4,314 11,179 9,279	(net APV) _{17 8} 6,865 2,600 6,865	<pre><pre>< prior <== from <== from </pre></pre>	 (net Case), Step 3b Runoff Exhibit (2017 UC 2,600 = 1,560 = 214 = -17.0% 	<u> </u>
(net IBNR) where (net APV) ₁ (net Case) therefore	17 & prior 7 & prior 17 & prior 17 & prior K	= = = = 4,314 11,179	(net APV) _{17 8} 6,865 2,600 6,865	<pre>c prior <pre>c == from <pre>c == from </pre></pre></pre>	 - (net Case), Step 3b Runoff Exhibit (2017 UC 2,600 = 1,560 = 214 	<u> </u>