6. (3.5 points)

Losses on a policy have the following distribution:

- 60% probability of a loss between $0 and $250,000
- 30% probability of a loss between $250,000 and $500,000
- 10% probability of a loss between $500,000 and $1 million

Losses are uniformly distributed within each range. Assume a 20% trend is applied uniformly to all losses.

a. (1.5 points)

Draw a diagram depicting the cumulative loss distribution described above before and after the 20% trend. Label all relevant features of the diagram.

b. (2 points)

Calculate the implied trend for the layer $500,000 excess of $500,000.

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EXAM 8 FALL 2014 SAMPLE ANSWERS AND EXAMINER'S REPORT

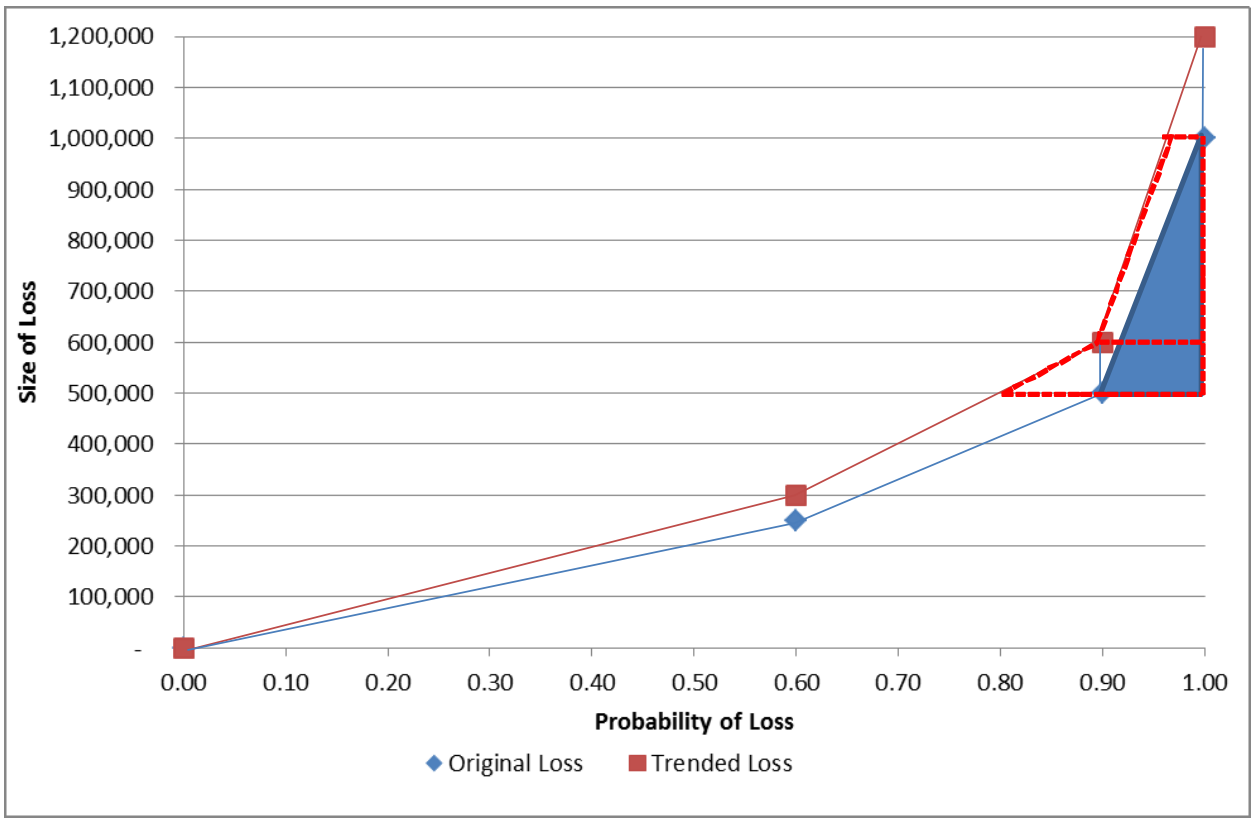
QUESTION 6

TOTAL POINT VALUE: 3.5

LEARNING OBJECTIVE: B1

SAMPLE ANSWERS

Part a: 1.5 points



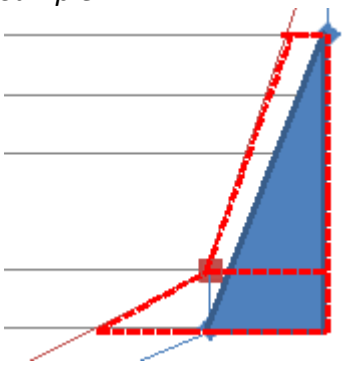
cum. prob	Original Loss	Trended Loss
0.00	-	-
0.60	250,000	300,000
0.90	500,000	600,000
1.00	1,000,000	1,200,000

Trended loss = original loss * 1.2

EXAM 8 FALL 2014 SAMPLE ANSWERS AND EXAMINER'S REPORT

Part b: 2 points

Sample 1



From Part a), we can see that the implied trend is defined by the area of the two trapezoid divided by the area of the triangle

Triangle:	(500)/2*0.1 = 25
Probability:	0.1 * (200/600) = 0.0333. This is the length of the top trapezoid 0.3 * (200/300) = 0.2. This is the length of the bottom trapezoid
Top Trapezoid	(0.1+0.0333)/2*400 = 26.66666
Bottom Trapezoid	(0.1+0.2)/2*100 = 15
Implied Trend:	(15+26.6666)/25 -1= 0.667

Sample 2

Before Trend

E[x; 1M]				
[1]	[2]	[3]	[4]	[5]=[4]*[1]
Prob	Layer	Formula	Average Loss in Layer	Expected Loss in Layer
0.6	0-250k	(0+250)/2	125	75.00
0.3	250k-500k	(250+500)/2	375	112.50
0.1	500k-1M	(500+1000)/2	750	75.00
Total				**262.50**

EXAM 8 FALL 2014 SAMPLE ANSWERS AND EXAMINER'S REPORT

E[x; 500K]

[1] Prob	[2] Layer	[3] Formula	[4] Average Loss in Layer	[5]=[4]*[1] Expected Loss in Layer
0.6	0-250k	(0+250)/2	125	75.00
0.3	250k-500k	(250+500)/2	375	112.50
0.1	500k-1m	(500+500)/2	500	50.00
Total				**237.50**

E[x ; 500k xs 500k] = E[x; 1M] - E[x; 500K]
= 25.00

After Trend

E[x'; 1M]

[1] Revised Prob	[2] Layer	[3] Formula	[4] Average Loss in Layer	[5]=[4]*[1] Expected Loss in Layer
0.6	0-300k	(0+300)/2	150	90.00
0.3	300k-600k	(300+600)/2	450	135.00
0.1 * (400/600) = 0.06666	600k-1.2M	(600+1000)/2	800	53.33
0.1 * (200/600) = 0.03333	600k-1.2M	(1000+1000)/2	1000	33.33
Total				**311.66**

E[x'; 500k]

[1] Revised Prob	[2] Layer	[3] Formula	[4] Average Loss in Layer	[5]=[4]*[1] Expected Loss in Layer
0.6	0-300k	(0+300)/2	150	90.00
0.3 * (200/300) =	300k-	(300+500	400	

0.2		600k	)/2		80.00
0.3 * (100/300) =		300k-	(500+500		
0.1		600k	)/2	500	50.00
		600k-	(500+500		
	0.1	1.2M	)/2	500	50.00

Total	**270.00**

E[x' ; 500k xs 500k] = E[x'; 1M] - E[x'; 500K] =	**41.66**

Implied Trend =	**{E[x' ; 500k xs 500k] / E[x; 500k xs 500k]} -1**	**0.666**

EXAMINER'S REPORT

Part a

The vast majority of candidates received full credit on this part. To receive full credit, the candidates were expected to graph the original losses and trended losses as well as label the x and y axis and the lines through the points.

The most common errors were:

- Only graphing 1 line instead of 2
- Using the wrong trend
- Not labeling the points or making it clearly on the axis

Part b

The candidates were expected to calculate the trend in the 500K xs 500K layer. While most candidates drew the graph in Part A correctly, a vast majority only got partial credit for part B. Almost all candidates understood and applied the implied trend formula correctly. However, errors were made in calculating the correct pieces that made up the trend.

To receive full credit the candidates were expected to:

- Calculate the expected loss in the 500k xs 500k in the original and trended distributions
- Calculate the implied trend in layer as the trended expected loss divided by untrended expected loss

The most common errors were:

- Calculated expected loss in 700k xs 500k in the trended distribution

- Calculated expected loss in 600k xs 600k in the trended distribution
- Errors were made in calculating the correct probabilities for 500k and 1M on the trended line
- Errors were made in applying the area formula for trapezoid on non trapezoid shapes