

A	B	C	D	E
A. INPUTS				
Assume claim frequency (#) is Log-Normal				
5	Median	1,000	Manual entry	
6	Mean	1,001	Manual entry	
7	Std Dev	45		$=((EXP(C19)-1)*EXP(2*C17+C19))^0.5$
Assume claim severity (\$) is Log-Normal				
10	Median	50	Manual entry	
11	Mean	100	Manual entry	
12	Std Dev	99		$=SQRT((EXP(C24)-1)*EXP(2*C22+C24))$

A	B	C	D	E
B1. CALCULATIONS				
Underlying Normal for Frequency				
17	mu	6.908		$=LN(C5)$
18	mu+s ² /2	6.909		$=LN(C6)$
19	sigma ²	0.002		$=2*(C18-C17)$
20	sigma	0.045		$=SQRT(C19)$
Underlying Normal for Severity				
23	mu	3.912		$=LN(C10)$
24	mu+s ² /2	4.605		$=LN(C11)$
25	sigma ²	1.386		$=2*(C24-C23)$
26	sigma	1.177		$=SQRT(C25)$

A	B	C	D	E
B2. MORE CALCULATIONS				
Generate product of two log-normal distributions:				
Assume independence				
Distribution of Total Losses (\$) is Log-Normal				
Underlying Normal for their Product				
34	mu1+mu2	10.820		$=C17+C23$
35	s1 ² +s2 ²	1.388		$=C19+C25$
36	SIGMA	1.178		$=SQRT(C35)$
37	MU+S ² /2	11.514		$=C34+C35/2$
Cell Formula				
H5	$=EXP(C34)$			
H6	$=EXP(C37)$			
H7	$=((EXP(C36)-1)*EXP(2*C34+C36))^0.5$			
H10	$=LOGNORM.INV(I10,C$34,C$36)$			
H11	$=LOGNORM.INV(I11,C$34,C$36)$			
H14	$=H$24*G14$			
I14	$=LOGNORM.DIST(H14,C$34,C$36,1)$			
Pull these down to fill out the table				

Mean and variance formula: Eq 44 & 45
www.appliedbusinesseconomics.com/files%5Cgvsplndrn01.pdf

F	G	H	I
C. OUTPUT			
Results: Log-Normal Product			
Median	50,000		
Mean	100,100		
StdDev	135,143		
	Cutoffs	Percentile	
	\$4,966	0.025	
	\$503,391	0.975	

Scale	Loss\$	CDF
0.05	2,500	0.006
0.1	5,000	0.025
0.2	10,000	0.086
0.3	15,000	0.153
0.4	20,000	0.218
0.5	25,000	0.278
0.6	30,000	0.332
0.7	35,000	0.381
0.8	40,000	0.425
0.9	45,000	0.464
1	50,000	0.500
1.1	55,000	0.532
1.2	60,000	0.561
1.4	70,000	0.612
1.6	80,000	0.655
1.8	90,000	0.691
2	100,000	0.722
2.2	110,000	0.748
2.4	120,000	0.771
2.6	130,000	0.791
2.8	140,000	0.809
3	150,000	0.824
4	200,000	0.880
5	250,000	0.914
6	300,000	0.936
7	350,000	0.951
8	400,000	0.961
9	450,000	0.969
10	500,000	0.975
11	550,000	0.979
12	600,000	0.983
13	650,000	0.985
14	700,000	0.987
15	750,000	0.989
16	800,000	0.991
20	1,000,000	0.994
1000	50,000,000	1.000