1a.

1. BBB: λ = -ln(1 - 0.0025) = 0.00250313
2. BBB-: λ = -ln(1 - 0.0040) = 0.00400802
3. BB+: λ = -ln(1 - 0.0065) = 0.0065212
4. BB: λ = -ln(1 - 0.0100) = 0.01005033
5. BB-: λ = -ln(1 - 0.0160) = 0.01612938
6. B+: λ = -ln(1 - 0.0250) = 0.0253178
7. B: λ = -ln(1 - 0.0400) = 0.04082199

1b.

Interval $0 - $5,000,000: 0.9999

Interval $5,000,000 - $10,000,000: 0

Interval $10,000,000 - $15,000,000: 0

Interval $15,000,000 - $20,000,000: 0

Interval $20,000,000 - $25,000,000: 0

Interval $25,000,000 - $30,000,000: 0

Interval $30,000,000 - $35,000,000: 0

Interval $35,000,000 - $40,000,000: 0

Interval $40,000,000 - $45,000,000: 0

Interval $45,000,000 - $50,000,000: 0

Interval $50,000,000 - $55,000,000: 0

Interval $55,000,000 - $60,000,000: 0

Interval $60,000,000 - $65,000,000: 0

Interval $65,000,000 - $70,000,000: 0

Interval $70,000,000 - $75,000,000: 0

Interval $75,000,000 - $80,000,000: 0

Interval $80,000,000 - $85,000,000: 0

Interval $85,000,000 - $90,000,000: 0

Interval $90,000,000 - $95,000,000: 0

Interval $95,000,000 - $100,000,000: 0

2a.

Distance to default for BBB: 2.8070

Distance to default for BBB-: 2.6521

Distance to default for BB+: 2.4838

Distance to default for BB: 2.3263

Distance to default for BB-: 2.1444

Distance to default for B+: 1.9600

Distance to default for B: 1.7507

2b.

Interval $0 - $5,000,000: 0.0000

Interval $5,000,000 - $10,000,000: 0.0000

Interval $10,000,000 - $15,000,000: 0.000

Interval $15,000,000 - $20,000,000: 0.000

Interval $20,000,000 - $25,000,000: 0.000

Interval $25,000,000 - $30,000,000: 0.000

Interval $30,000,000 - $35,000,000: 0.00

Interval $35,000,000 - $40,000,000: 0.00

Interval $40,000,000 - $45,000,000: 0.00

Interval $45,000,000 - $50,000,000: 0.00

Interval $50,000,000 - $55,000,000: 0.00

Interval $55,000,000 - $60,000,000: 0.00

Interval $60,000,000 - $65,000,000: 0.00

Interval $65,000,000 - $70,000,000: 0.00

Interval $70,000,000 - $75,000,000: 0.00

Interval $75,000,000 - $80,000,000: 0.00

Interval $80,000,000 - $85,000,000: 0.00

Interval $85,000,000 - $90,000,000: 0.00

Interval $90,000,000 - $95,000,000: 0.00

Interval $95,000,000 - $100,000,000: 0.00

3a.

Formula for initial distance to default

DD(BBB) = (ln(V/DF) + (μ - σ^2/2)t) / (σ√t)

Initial distance to default for BBB: -0.0031

Initial distance to default for BBB-: -0.0050

Initial distance to default for BB+: -0.0081

Initial distance to default for BB: -0.0125

Initial distance to default for BB-: -0.0201

Initial distance to default for B+: -0.0313

Initial distance to default for B: -0.0502

3b.

Probability of losses in interval [0, 5000000): 0.0000

Probability of losses in interval [5000000, 10000000): 0.0000

Probability of losses in interval [10000000, 15000000): 0.0000

Probability of losses in interval [15000000, 20000000): 0.0000

Probability of losses in interval [20000000, 25000000): 0.0000

Probability of losses in interval [25000000, 30000000): 0.0000

Probability of losses in interval [30000000, 35000000): 0.0000

Probability of losses in interval [35000000, 40000000): 0.0001

Probability of losses in interval [40000000, 45000000): 0.0002

Probability of losses in interval [45000000, 50000000): 0.0002

Probability of losses in interval [50000000, 55000000): 0.0007

Probability of losses in interval [55000000, 60000000): 0.0012

Probability of losses in interval [60000000, 65000000): 0.0043

Probability of losses in interval [65000000, 70000000): 0.0069

Probability of losses in interval [70000000, 75000000): 0.0163

Probability of losses in interval [75000000, 80000000): 0.0303

Probability of losses in interval [80000000, 85000000): 0.0722

Probability of losses in interval [85000000, 90000000): 0.1429

4. Solution in excel

rho 0.34

5. Solution in excel

|  |  |  |  |
| --- | --- | --- | --- |
| $0 | $50,00,000 | 5535 | 0.554 |
| $50,00,000 | $1,00,00,000 | 2194 | 0.219 |
| $1,00,00,000 | $1,50,00,000 | 839 | 0.084 |
| $1,50,00,000 | $2,00,00,000 | 304 | 0.030 |
| $2,00,00,000 | $2,50,00,000 | 473 | 0.047 |
| $2,50,00,000 | $3,00,00,000 | 85 | 0.009 |
| $3,00,00,000 | $3,50,00,000 | 191 | 0.019 |
| $3,50,00,000 | $4,00,00,000 | 161 | 0.016 |
| $4,00,00,000 | $4,50,00,000 | 9 | 0.001 |
| $4,50,00,000 | $5,00,00,000 | 81 | 0.008 |
| $5,00,00,000 | $5,50,00,000 | 9 | 0.001 |
| $5,50,00,000 | $6,00,00,000 | 38 | 0.004 |
| $6,00,00,000 | $6,50,00,000 | 29 | 0.003 |
| $6,50,00,000 | $7,00,00,000 | 0 | 0.000 |
| $7,00,00,000 | $7,50,00,000 | 22 | 0.002 |
| $7,50,00,000 | $8,00,00,000 | 7 | 0.001 |
| $8,00,00,000 | $8,50,00,000 | 0 | 0.000 |
| $8,50,00,000 | $9,00,00,000 | 3 | 0.000 |
| $9,00,00,000 | $9,50,00,000 | 0 | 0.000 |
| $9,50,00,000 | $10,00,00,000 | 5 | 0.001 |