$npoints := 1000$

$x1 := -15 \quad y1 := -30 \quad x2 := -50 \quad y2 := 75 \quad x\_bar := 0 \quad y\_bar := 0$

$L := \sqrt{(x2 - x1)^2 + (y2 - y1)^2}$

$dL := \frac{L}{npoints}$

$theta := \operatorname{atan}\left(\frac{y2 - y1}{x2 - x1}\right)$

$x_1 := x1 - dL \cdot \frac{\cos(theta)}{2} \qquad y_1 := y1 - dL \cdot \frac{\sin(theta)}{2}$

$i := 2 .. npoints$

$x_i := x_{i-1} - dL \cdot \cos(theta) \qquad y_i := y_{i-1} - dL \cdot \sin(theta)$

$i := 1 .. npoints$

$R_i := \sqrt{\left(x_i - x\_bar\right)^2 + \left(y_i - y\_bar\right)^2}$

$R1 := 23.71$

$max(R)$

$z := min(R)$

$CCC(R) :=$ for $j \in 11$
  $a \leftarrow 1000000$
  for $i \in 1 .. 1000$
    $a \leftarrow R_i$ if $a > R_i$
  $z \leftarrow a$

$zzz := CCC(R)$

$zzz = 23.71709$

$$CC(R1, R, \Delta r, npoints) := \left| \begin{array}{l} \text{for } j \in 1 .. 11 \\ \quad \left| \begin{array}{l} RR_j \leftarrow R1 + (j - 1)\cdot \Delta r \\ count_j \leftarrow 0 \\ \text{for } i \in 1 .. npoints \\ \quad count_j \leftarrow count_j + 1 \text{ if } RR_j > R_i \end{array} \right. \\ z \leftarrow count \end{array} \right.$$

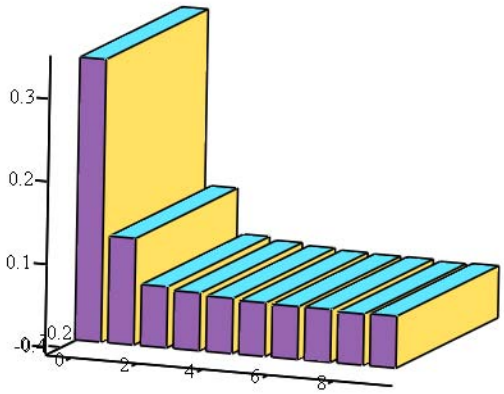
$$zz := CC(R1, R, 6.64, npoints)$$

$$zz = \begin{pmatrix} 0 \\ 0 \\ 342 \\ 471 \\ 545 \\ 615 \\ 682 \\ 747 \\ 811 \\ 875 \\ 937 \\ 1000 \end{pmatrix}$$

$$i := 0 .. 9$$

$$PR_i := \frac{zz_{i+2} - zz_{i+1}}{npoints}$$

$$PR = \begin{pmatrix} 0.342 \\ 0.129 \\ 0.074 \\ 0.07 \\ 0.067 \\ 0.065 \\ 0.064 \\ 0.064 \\ 0.062 \\ 0.063 \end{pmatrix}$$



PR

$$P_M := \begin{pmatrix} 0.522 \\ 0.243 \\ 0.114 \\ 0.053 \\ 0.025 \\ 0.0116 \\ 0.005 \\ 0.0025 \\ 0.0012 \\ 0.006 \end{pmatrix} \quad m := \begin{pmatrix} 4.165 \\ 4.495 \\ 4.825 \\ 5.115 \\ 5.485 \\ 5.815 \\ 6.145 \\ 6.475 \\ 6.805 \\ 7.135 \end{pmatrix} \quad r := \begin{pmatrix} 27.04 \\ 33.68 \\ 40.32 \\ 49.96 \\ 53.60 \\ 60.24 \\ 66.88 \\ 73.52 \\ 80.16 \\ 86.80 \end{pmatrix} \quad P_R := \begin{pmatrix} 0.336 \\ 0.128 \\ 0.074 \\ 0.070 \\ 0.067 \\ 0.065 \\ 0.064 \\ 0.063 \\ 0.063 \\ 0.062 \end{pmatrix}$$

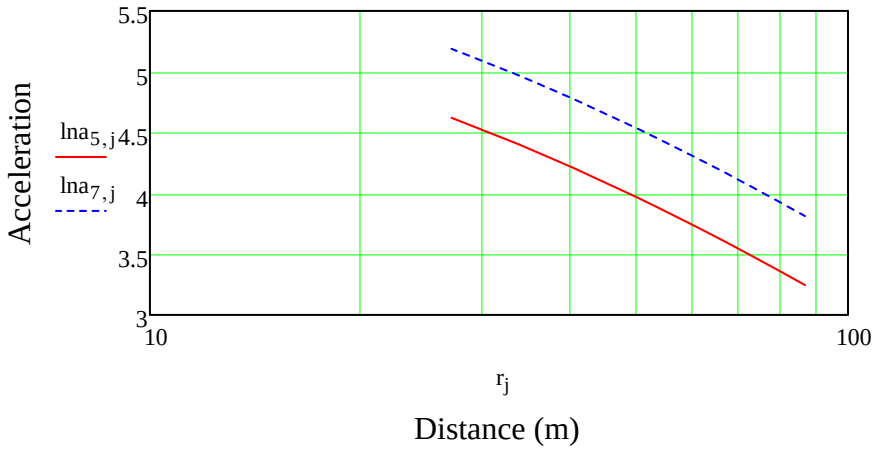
Mean annual rate of exceedance in threshold magnitude (4.0) (i.e. total occurance in seismic zone in one year):

$\nu := 2.512$

$nm := rows(m) - 1 \qquad nm = 9 \qquad nr := rows(r) - 1 \qquad nr = 9$

$i := 0 .. nm \qquad j := 0 .. nr$

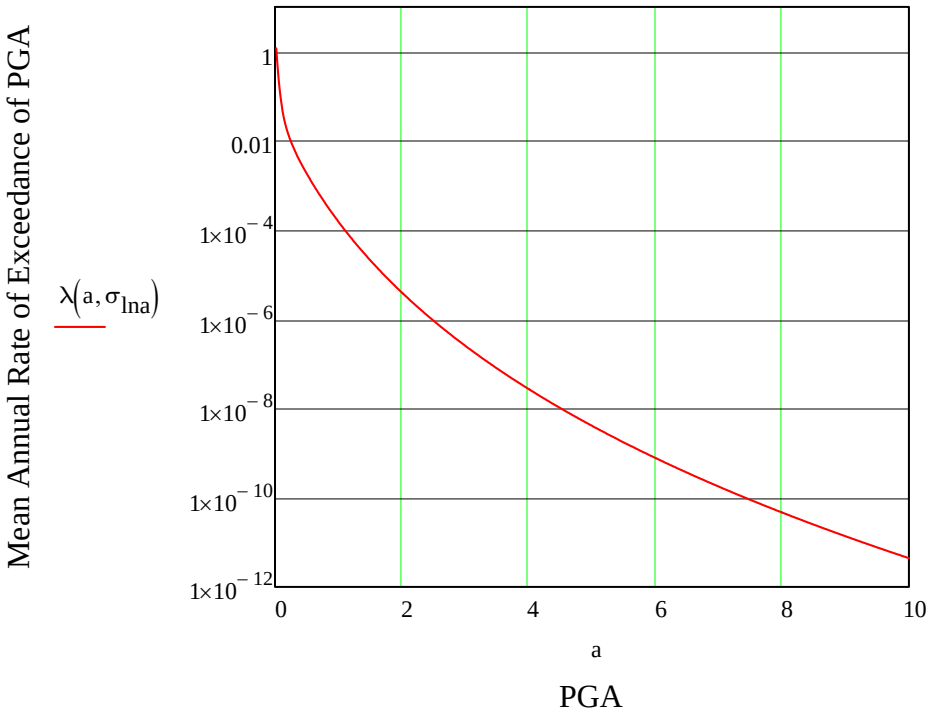
$lna_{i,j} := 6.74 + 0.859 \cdot m_i - 1.8 \cdot \ln\left(r_j + 25\right) \qquad \sigma_{lna} := 0.57$



$$lna = \begin{pmatrix} 3.20411 & 2.98796 & 2.795 & 2.54722 & 2.46187 & 2.31589 & 2.18086 & 2.05527 & 1.93787 & 1.82765 \\ 3.48758 & 3.27143 & 3.07847 & 2.83069 & 2.74534 & 2.59936 & 2.46433 & 2.33874 & 2.22134 & 2.11112 \\ 3.77105 & 3.5549 & 3.36194 & 3.11416 & 3.02881 & 2.88283 & 2.7478 & 2.62221 & 2.50481 & 2.39459 \\ 4.02016 & 3.80401 & 3.61105 & 3.36327 & 3.27792 & 3.13194 & 2.99691 & 2.87132 & 2.75392 & 2.6437 \\ 4.33799 & 4.12184 & 3.92888 & 3.6811 & 3.59575 & 3.44977 & 3.31474 & 3.18915 & 3.07175 & 2.96153 \\ 4.62146 & 4.40531 & 4.21235 & 3.96457 & 3.87922 & 3.73324 & 3.59821 & 3.47262 & 3.35522 & 3.245 \\ 4.90493 & 4.68878 & 4.49582 & 4.24804 & 4.16269 & 4.01671 & 3.88168 & 3.75609 & 3.63869 & 3.52847 \\ 5.1884 & 4.97225 & 4.77929 & 4.53151 & 4.44616 & 4.30018 & 4.16515 & 4.03956 & 3.92216 & 3.81194 \\ 5.47187 & 5.25572 & 5.06276 & 4.81498 & 4.72963 & 4.58365 & 4.44862 & 4.32303 & 4.20563 & 4.09541 \\ 5.75534 & 5.53919 & 5.34623 & 5.09845 & 5.0131 & 4.86712 & 4.73209 & 4.6065 & 4.4891 & 4.37888 \end{pmatrix}$$

Mean annual rate of exceedance of PGA:

$$\lambda(a,\sigma_{lna}) := \nu \cdot \sum_{j=0}^{nr} \sum_{i=0}^{nm} \left[\left(1 - pnorm\left(\ln(a \cdot 981), lna_{i,j}, \sigma_{lna}\right)\right) \cdot P_{M_i} \cdot P_{R_j} \right]$$



$a := 0.01$

$$XX_{line_{i,j}} := \nu \cdot \left[\left(1 - pnorm\left(\ln(a \cdot 981), lna_{i,j}, \sigma_{lna} \right) \right) \cdot P_{M_i} \cdot P_{R_j} \right]$$

$$XX_{line} = \begin{pmatrix} 0.41718 & 0.14968 & 0.07911 & 0.06226 & 0.05472 & 0.04455 & 0.03597 & 0.02846 & 0.02249 & 0.017 \\ 0.20155 & 0.07489 & 0.04149 & 0.03553 & 0.03236 & 0.02818 & 0.0244 & 0.02072 & 0.01756 & 0.014 \\ 0.09578 & 0.03618 & 0.02057 & 0.01859 & 0.01735 & 0.01589 & 0.01452 & 0.01306 & 0.01175 & 0.010 \\ 0.04468 & 0.01698 & 0.00975 & 0.00905 & 0.00856 & 0.00806 & 0.00762 & 0.00712 & 0.00667 & 0.006 \\ 0.0211 & 0.00803 & 0.00464 & 0.00436 & 0.00416 & 0.004 & 0.00388 & 0.00373 & 0.00363 & 0.003 \\ 0.00979 & 0.00373 & 0.00216 & 0.00204 & 0.00195 & 0.00188 & 0.00185 & 0.0018 & 0.00178 & 0.001 \\ 0.00422 & 0.00161 & 0.00093 & 0.00088 & 0.00084 & 0.00082 & 0.0008 & 0.00079 & 0.00078 & 0.000 \\ 0.00211 & 0.0008 & 0.00046 & 0.00044 & 0.00042 & 0.00041 & 0.0004 & 0.0004 & 0.00039 & 0.000 \\ 0.00101 & 0.00039 & 0.00022 & 0.00021 & 0.0002 & 0.0002 & 0.00019 & 0.00019 & 0.00019 & 0.000 \\ 0.00506 & 0.00193 & 0.00112 & 0.00106 & 0.00101 & 0.00098 & 0.00096 & 0.00095 & 0.00095 & 0.000 \end{pmatrix}$$

Magnitude	27.04	33.68	40.32	49.96	53.6	60.24	66.88	73.52	80.16	86.8
4.165	0.4172	0.3929	0.3592	0.2988	0.2744	0.2303	0.1888	0.1518	0.1199	0.0934
4.495	0.0768	0.0749	0.0718	0.0650	0.0618	0.0555	0.0488	0.0421	0.0357	0.0298
4.825	0.0211	0.0209	0.0206	0.0197	0.0192	0.0181	0.0168	0.0153	0.0138	0.0122
5.115	0.0093	0.0093	0.0092	0.0091	0.0089	0.0087	0.0083	0.0079	0.0074	0.0069
5.485	0.0042	0.0042	0.0042	0.0042	0.0042	0.0041	0.0041	0.0040	0.0039	0.0037
5.815	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0018	0.0018
6.145	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008
6.475	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
6.805	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
7.135	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009