a) Compare the following systems A and B in terms of availability

System A fails 3 times per hour for 30 seconds

$t_{up(A)}$ = 60m - 3 * 30s = 58,5 minutes

$t_{sum(A)}$ = 60 minutes

availability$_A$ = $t_{up(A)}$ /$t_{sum(A)}$ → 58,5m/60m = 97,5 %

System B fails 30 times per hour for 3 seconds

$t_{up(B)}$ = 60m - 30 * 3s = 58,5 minutes

$t_{sum(B)}$ = 60 minutes

availability$_B$ = $t_{up(B)}$ /$t_{sum(B)}$ → 58,5m/60m = 97,5 %

b) How many redundant systems A do you need to achieve availability of 99.9% per hour ?

$goal\_failure\_rate_A = 1 - 0{,}999 =$ 0,001

$failure\_rate_A = 1 - availability_A = 1 - 0{,}975 =$ 0,025

x = amount of redundant systems

formula = $(failure\_rate_A)^x >= goal\_failure\_rate_A$

→ *transform equation to get x*

→ $x * \ln(failure\_rate_A) <= \ln(goal\_failure\_rate_A)$

→ $x >= \ln(goal\_failure\_rate_A) / \ln(failure\_rate_A)$

→ $x >= \ln(0{,}001) / \ln(0{,}025) = 1.87259...$ → 2 systems