1. Poison Process (50%)

依照講義的 thinning algorithm, 因為 λ 必須 ≥ λ(t), 所以選擇 λ = 7

```
發生事件的時間 [0.018421378910532665, 0.19317243924494784, 0.3989568914858447, 0.567960529345886, 0.6728310746625743, 0.769016082
207689, 0.853998234428013, 0.9850406305992088, 1.2814937204255237, 1.719488501034297, 1.9034757783537217, 2.4994785295872584,
2.904886776723676, 3.027219286619127, 3.03474424932007, 3.7089986305119536, 3.7856702716160866, 4.0726914887754635, 4.730842408
665144, 5.861729237445085, 6.266190398948064, 6.577897155600677, 6.814836230509739, 6.889510799906991, 7.353755255401663, 7.525
762547578419, 7.68052624863091, 7.787952825843336, 8.178445559402041, 8.359069239793662, 8.41975952564034, 8.723458996333955,
8.778661422423212, 9.300601603265827, 9.364411023195732, 9.406783827129999, 9.680658627251082, 9.777419642410743, 9.96482250679
938]
總次數 39
```

2. Multivariate Normal Distribution (50%)

因為 Gaussion copulas 不變的是 correlation matrix, 且在轉換回來時會

乘上 standard deviation, 因此設 $\mathrm{Cor(X)} = \mathrm{Cor(W)} = \begin{bmatrix} 1 & \frac{0.5}{2} & \frac{0.5}{3} \\ \frac{0.5}{2} & 1 & \frac{0.5}{6} \\ \frac{0.5}{3} & \frac{0.5}{6} & 1 \end{bmatrix}$,

並用cholesky decomposition 分解成 $L = \begin{bmatrix} 1 & 0 & 0 \\ 0.25 & 0.9683 & 0 \\ 0.1667 & 0.043 & 0.9851 \end{bmatrix}$

再生成 $y = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix} \sim U(0,1)$ *互相獨立*

則 $W = Ly$ *為multivariate normal distribution*

接著計算 $\Phi(W_i), \mathrm{i} = 1,2,3$

則 $X_1 = -\log\big(\Phi(W_i)\big) \sim Exp(\lambda = 1)$

$X_2 = -2\log\big(\Phi(W_i)\big) \sim Exp\left(\lambda = \frac{1}{2}\right)$

$X_3 = -3\log\big(\Phi(W_i)\big) \sim Exp(\lambda = \frac{1}{3})$

且 $Cov(X_i, X_j) = 0.5$

Via simulation:

```
mean =  1.0027306689482658 2.0336738845926288 3.0378717822323504
var =  1.176773095806823 4.238763526121642 9.761559808144106
cov =
 [[1.17795105 0.52313043 0.42097262]
 [0.52313043 4.24300653 0.63913949]
 [0.42097262 0.63913949 9.77133114]]
cor =
 [[1.         0.23399658 0.12408331]
 [0.23399658 1.         0.09926175]
 [0.12408331 0.09926175 1.        ]]
```