(6) Gumbel Copula when $\alpha = 2$

$$C(u,v) = \exp\{-[(-\log u)^{\alpha} + (-\log v)^{\alpha}]^{\frac{1}{\alpha}}\}$$
$$= \exp\{-[(-\log u)^2 + (-\log v)^2]^{\frac{1}{2}}\}$$

$u \sim Exp(0.01)$ $\quad V \sim Exp(0.02)$

(a) both will default:

~~FTD = S×e^{-rT} ...~~

$F_1(T) = P(u \le 1) = 1 - e^{-0.01\times 1} = 0.9950166\%$

$F_2(T) = P(V \le 1) = 1 - e^{-0.02\times 1} = 1.980133\%$

$P = C(F_1(T), F_2(T)) = C(0.9950166\%, 1.980133\%)$

$= 0.00235139$

(b) At least one will default:

$P = F_1(T) + F_2(T) - C(F_1(T), F_2(T))$

$= 0.9950166\% + 1.980133\% - 0.00235139$

$= 0.0274001$

(7) $FTD = S \times e^{-rT} C(F_1(T), F_2(T))$

$= 1000000 \times e^{-0\times 1} \times C(F_1(1), F_2(1))$

$= 2351.9$

4 if $\alpha = 1$

$C_1(u,v) = u \times v$

Thus $FTD = S \times e^{-rT} C(F_1(1), F_2(1))$

$= 1000000 \times e^{-0\times 1} \times (0.9950166\% \times 1.980133\%)$

$= 197.0265$