$loss = D * LGD$

$closs = cPD * cLGD$

$EL = PD * ELGD$

$$Dcorr = \frac{PDJ - PD_1 PD_2}{\sqrt{PD_1(1-PD_1)PD_2(1-PD_2)}} = \frac{{}^{*}Cov(D_1, D_2)}{\sqrt{Var(D_1)\,Var(D_2)}}$$

$$^{*}Cov(D_1, D_2) = E[(X-EX)(Y-EY)] = E[XY] - E[X]E[Y]$$

$$= E[D_1 D_2] - E(D_1)E(D_2)$$

Bernoulli trials!!!

$$= PDJ - PD_1 PD_2$$

$$PDJ_{1,2} = \int_{-\infty}^{\phi^{-1}(PD_1)} \int_{-\infty}^{\phi^{-1}(PD_2)} \phi_2(z_1, z_2, \rho)\, dz_2\, dz_1$$

Bayes $\Rightarrow \mathbb{P}(A|B) = \dfrac{\mathbb{P}(A \cap B)}{\mathbb{P}(B)}$

Range of $PDJ_{1,2,3} \Rightarrow [0, \min(PDJ_{i,j})]$ $\quad i,j \in [1,3]$

$EL = \mathbb{E}(closs) = \sum_c closs * prob.$, where: $closs = cpd * clgd$

$ELGD = \dfrac{EL}{PD}$, Note: $\mathbb{E}[clgd] < ELGD$.

$PD = \mathbb{E}[cPD] = \sum cPD * prob.\ state.$

$cLGD = \mathbb{E}(clgd) = \sum clgd * prob.\ state.$