The variance of our 20 assets portfolio can be written out as $\sigma_p^2 = w^T.\Omega.w$, where w is a vector containing the weights of our assets, Ω is our variance-covariance matrix of our assets, and $w^T$is the transpose of our weight vector. Technically, the portfolio with the minimum variance is one where all weights in w would equal 0, however we have the extra conditions that $\sum_{i=1}^{20} w_i = 1 \rightarrow \sum_{i=1}^{20} w_i - 1 = 0$. Therefore, we have a constraint optimization problem, where we must minimize the Lagrange function to find the weights that give us the minimum variance for our portfolio, but also satisfy the given constraint,

$\Omega : asset\ Variance - Covaraince\ matrix\ of\ daily\ returns$

$w : weight\ vector\ , w^T : weight\ vector\ transpose$

$\lambda : Lagrange\ Multiplier$

$$J = w^T.\Omega.w + \lambda * \sum_{i=1}^{20} w_i - 1$$

$$\forall i \in (1, 2, \dots, 20)$$

$$\frac{\partial J}{\partial w_i} = \frac{\partial}{\partial w_i}\left(w^T.\Omega.w + \lambda * \sum_{i=1}^{20} w_i - 1\right)$$

$$0 = \frac{\partial w_j^T}{\partial x_i}\Omega_{\mathrm{jl}} w_l + w_{\mathrm{j}}^T \Omega_{\mathrm{jl}} \frac{\partial w_l}{\partial x_i} + \lambda$$

$$0 = \delta_{ij}\Omega_{\mathrm{jl}} w_l + w_{\mathrm{j}}^T \Omega_{\mathrm{jl}} \delta_{il} + \lambda$$

$$0 = \Omega_{\mathrm{il}} w_l + w_{\mathrm{j}}^T \Omega_{\mathrm{ji}} + \lambda$$

$$0 = 2 * \sum_{j=1}^{j=20} \sigma_{ij} w_j + \lambda$$

$$0 = \sum_{j=1}^{j=20} \sigma_{ij} w_j + \frac{\lambda}{2}$$

$$\frac{\partial J}{\partial \lambda} = 0 = \frac{\partial}{\partial \lambda}\left(w^T.\Omega.w + \lambda * \sum_{i=1}^{20} w_i - 1\right)$$

$$0 = \sum_{i=1}^{20} w_i - 1$$

$$\lambda = 0.0001, and\ weights\ listed\ above$$