# FORMULA DERIVATION - POLYGENIC MODEL

April 22, 2018

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## 0.1 Algorithm

Model:

$$y = X\beta + \epsilon$$

Transform:

$$\hat{\beta} = \frac{X^T X\beta}{n} + \frac{X^T \epsilon}{n}$$

$$E(\hat{\beta}) = \frac{X^T X}{n}\beta = \Omega\beta$$

$$Var(\hat{\beta}) = \frac{X^T}{n} Var(y) (\frac{X^T}{n})^T = \frac{X^T X}{n^2} = \frac{\Omega}{n}$$

where

$$\hat{\beta} \sim MVN(\Omega\beta, \Omega/n)$$

$$\beta_{k_j} \sim N(0, \sigma_k^2)$$