Merton Model for pricing options:

$$\frac{\partial u}{\partial \tau} = \frac{1}{2}\sigma_s^2 s^2 \frac{\partial^2 u}{\partial s^2} + (r - \mu\xi) s \frac{\partial u}{\partial s} - (r + \mu) u + \mu \int_0^\infty u(sy, \tau) p(y) dy$$

Black-Scholes Model for pricing options:

$$\frac{\partial w}{\partial t} = rw - rx\frac{\partial w}{\partial x} - \frac{1}{2}v^2 x^2 \frac{\partial^2 w}{\partial x^2}$$

Linear Convection Diffusion Equation:

$$\frac{\partial u}{\partial t} + c\frac{\partial u}{\partial x} = \frac{1}{\mathrm{Re}}\frac{\partial^2 u}{\partial x^2}$$

$$\vec{u}^{\,n+1} = f(\vec{u}^{\,n}) = \mathcal{L}(\vec{u}^{\,n}) = \mathrm{B}\vec{u}^{\,n}$$

Viscous Burger's Equation:

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} = \nu\frac{\partial^2 u}{\partial x^2}$$

Finite Difference Scheme:

$$\frac{\partial u}{\partial x} = \frac{u_{i+1} - u_{i-1}}{2\Delta x} + \mathcal{O}(\Delta x^2)$$

$$\frac{\partial^2 u}{\partial x^2} = \frac{u_{i+1} - 2u_i + u_{i-1}}{\Delta x^2} + \mathcal{O}(\Delta x^2)$$

$$\vdots$$

$$\frac{\partial \vec{u}_i}{\partial t} = \left(\frac{1}{\mathrm{Re}\Delta x^2} - \frac{c}{2\Delta x}\right) u_{i+1} - \frac{2}{\Delta x^2} u_i + \left(\frac{1}{\mathrm{Re}\Delta x^2} + \frac{c}{2\Delta x}\right) u_{i-1}$$

Singular Value Decomposition:

$$\min\{||\mathbf{X} - u \cdot v||_F\}$$

$$A = U\Sigma V^T$$