

# Financial Mathematics

Vector fields and  
ordinary differential equations

0038-1. Solve

$$\begin{aligned} dx/dt &= -8x - 18y + 6z \\ dy/dt &= 6x + 13y - 5z \\ dz/dt &= 0 \end{aligned}$$

with  $[x]_{t \rightarrow 0} = 2$ ,  $[y]_{t \rightarrow 0} = 6$ ,  $[z]_{t \rightarrow 0} = 1$ ,

0038-2. Solve

$$\begin{aligned} dx/dt &= -8x - 18y + 6 \\ dy/dt &= 6x + 13y - 5 \end{aligned}$$

with  $[x]_{t \rightarrow 0} = 2$ ,  $[y]_{t \rightarrow 0} = 6$ .

0038-3. Let  $V$  be the linear vector field defined by

$$V(x, y) = (-8x - 18y + 6, 6x + 13y - 5).$$

Find the flowline of  $V$  footed at  $(2, 6)$ .



0038-4. Find the reverse gradient flow for

$$f(x, y) = 10x^2 + 6xy + 2y^2 + 2x + 5y - 7,$$

footed at  $(1, -2)$ .

