

**LISTA nr 5: Liniowe równania stochastyczne**

**Zadanie 1.** Rozwiąż podane równania stochastyczne:

$$1. \begin{cases} dX_t = X_t dt + 2X_t dW_t \\ X_0 = 3 \end{cases}$$

$$2. \begin{cases} dX_t = -3X_t dt + \frac{1}{3}X_t dW_t \\ X_0 = 2 \end{cases}$$

$$3. \begin{cases} dX_t = 7X_t dW_t \\ X_0 = 1 \end{cases}$$

$$4. \begin{cases} dX_t = (8 - X_t)dt + 3dW_t \\ X_0 = -5 \end{cases}$$

$$5. \begin{cases} dX_t = (2X_t - 5)dt - dW_t \\ X_0 = 1 \end{cases}$$

$$6. \begin{cases} dX_t = (1 + X_t^2)dt \\ X_0 = 0 \end{cases}$$

$$7. \begin{cases} dX_t = (t + 1)dW_t \\ X_0 = 1 \end{cases}$$

**Zadanie 2. (domowe)** Rozwiąż podane równania stochastyczne:

$$1. \begin{cases} dX_t = -2X_t dt + 4X_t dW_t \\ X_0 = 3 \end{cases}$$

$$2. \begin{cases} dX_t = -X_t dt + 2X_t dW_t \\ X_0 = 1 \end{cases}$$

$$3. \begin{cases} dX_t = \frac{1}{2}X_t dt + 3X_t dW_t \\ X_0 = 1 \end{cases}$$

$$4. \begin{cases} dX_t = X_t dW_t \\ X_0 = 2 \end{cases}$$

$$5. \begin{cases} dX_t = (X_t + 3)dt + 10dW_t \\ X_0 = 4 \end{cases}$$

$$6. \begin{cases} dX_t = \frac{1}{2}(X_t^2 - 1)dt \\ X_0 = 0 \end{cases}$$

$$7. \begin{cases} dX_t = (aX_t + b)dt \\ X_0 = \eta \end{cases}$$

$$8. \begin{cases} dX_t = 2t dW_t \\ X_0 = 2 \end{cases}$$

$$9. \begin{cases} dX_t = X_t dY_t, & Y_t = t + 2W_t \\ X_0 = 1 \end{cases}$$

$$10. \begin{cases} dX_t = X_t dY_t, & Y_t = 2W_t \\ X_0 = 1 \end{cases}$$