

## Aufg 5

$$(a) \text{Var}(X+2Y-1) = \text{Var}(X+2Y) = \text{Var}(X) + \text{Var}(2Y) + 2 \text{Cov}(X, 2Y) \\ = 1 + 4 + 0 = 5$$

$$(b) \text{Cov}(X+2Y, 2X-Y) = 2 \text{Var}(X) - \text{Cov}(X, Y) + 4 \text{Cov}(Y, X) - 2 \text{Var}(Y) = 0$$

$$(c) \text{Var}(X+XY) = \text{Var}(X) + \text{Var}(XY) + 2 \text{Cov}(X, XY)$$

$$= 1 + \mathbb{E}(X^2 Y^2) - (\mathbb{E}(XY))^2 + 2 \mathbb{E}(X^2 Y) - \mathbb{E}X \mathbb{E}(XY) \\ \text{X, Y unabh.} \rightarrow = 1 + \underbrace{\mathbb{E}X^2}_{\text{Var}(X)} \underbrace{\mathbb{E}Y^2}_{\text{Var}(Y)} - (\mathbb{E}X \mathbb{E}Y)^2 + 2 \underbrace{\mathbb{E}X^2}_{\text{Var}(X)} \mathbb{E}Y - \mathbb{E}X \mathbb{E}X \mathbb{E}Y$$

$$= 1 + 1 - 0 + 0 - 0 = \underline{\underline{2}}$$