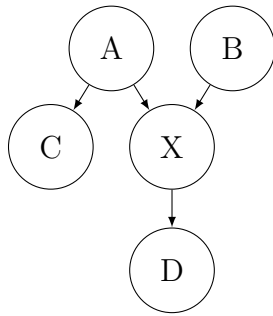


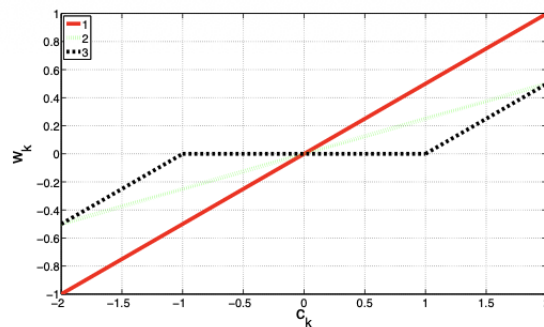
1 Bayes net reformulation

Given the following BN



1. Write a list of the conditional probability tables (e.g. $\psi_{Y,Z}(Y, Z)$) needed to specify the distribution represented by this BN.
2. Suppose we learn that the value of X is fixed and constant. Write a list of the CPTs needed to specify the new distribution. (These CPTs should not include X because it is not a random variable in this case.)
3. Draw a BN that is a minimal I-map for the modified distribution.
4. Draw an MRF for the modified distribution.

2 Linear regression shrinkage



Consider performing linear regression with an orthonormal design matrix, so $\|\mathbf{x}_{:,k}\|_2^2 = 1$ for each column (feature) k , and $\mathbf{x}_{:,k}^T \mathbf{x}_{:,j} = 0$, so we can estimate each parameter w_k separately. The figure plots $\hat{w}_k$ vs $c_k = 2\mathbf{y}^T \mathbf{x}_{:,k}$, the correlation of feature k with the response, for 3 different estimation methods: ordinary least squares (OLS), ridge regression with parameter λ_2 , and lasso with parameter λ_1 .

Quiz 9

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Spring 2026

1. Unfortunately we forgot to label the plots. Which method does the solid (1), dotted (2) and dashed (3) line correspond to?
2. What is the value of λ_1 ?
3. What is the value of λ_2 ?