

# Neural Network Variants




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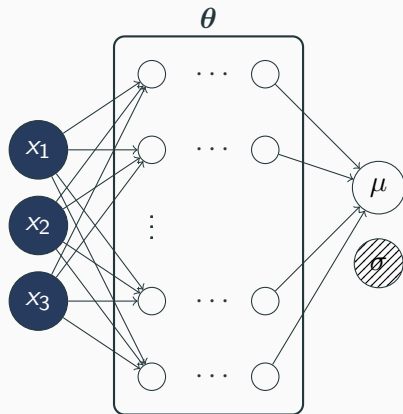
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# Notation

Symbol	Meaning
	Input node
	Trainable parameter
	Non-trainable parameter

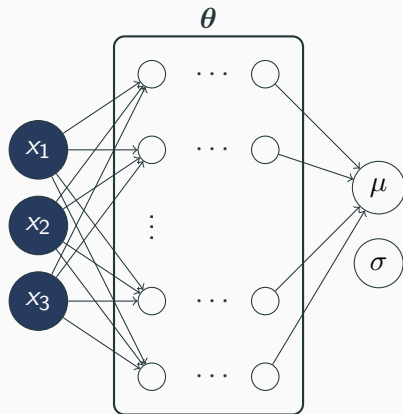
## Homoscedastic model with fixed noise



$$p(y_i|\mathbf{x}_i, \boldsymbol{\theta}) = \mathcal{N}(y_i|\mu_i, \sigma^2)$$

Find MLE of  $\boldsymbol{\theta}$  by  
minimizing the negative  
log-likelihood

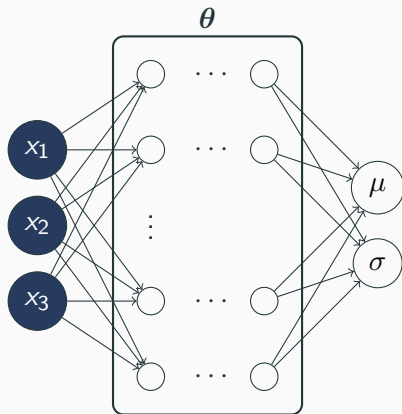
## Homoscedastic model with trainable noise



$$p(y_i|\mathbf{x}_i, \boldsymbol{\theta}) = \mathcal{N}(y_i|\mu_i, \sigma^2)$$

Find MLE of  $\boldsymbol{\theta}$  and  $\sigma$  by minimizing the negative log-likelihood

# Heteroscedastic model with trainable noise



$$p(y_i|\mathbf{x}_i, \boldsymbol{\theta}) = \mathcal{N}(y_i|\mu_i, \sigma_i^2)$$

Find MLE of  $\boldsymbol{\theta}$  by  
minimizing the negative  
log-likelihood