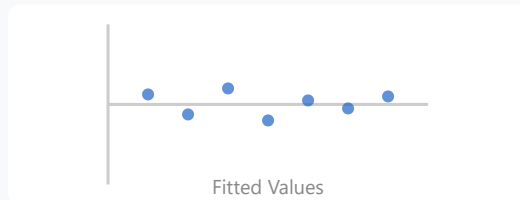


## Residual Analysis and Diagnostics

Residuals: Differences between observed and predicted values

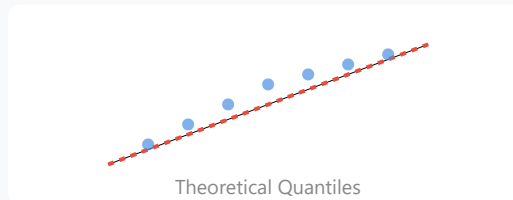
$$\text{Residual} = y - \hat{y}$$

Residual Plot



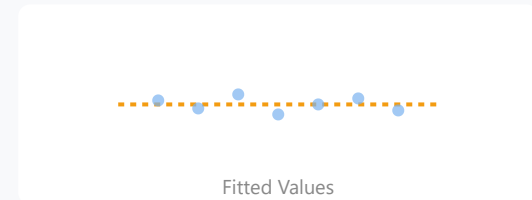
Random scatter around zero indicates good fit

Q-Q Plot



Checks normal distribution of residuals

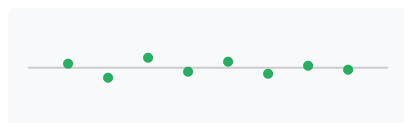
Scale-Location Plot



Detects heteroscedasticity (non-constant variance)

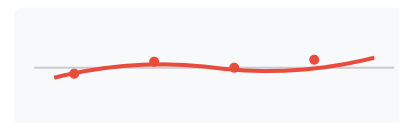
### Ideal vs Problematic Patterns

✓ Good Pattern



Random scatter, constant variance

✗ Bad Pattern



Curved pattern, non-linearity



What to Check



Non-linearity



Heteroscedasticity



Outliers



Normal distribution