Comparison between **Homoscedasticity** and **Heteroscedasticity**:

Aspect	Homoscedasticity	Heteroscedasticity
Definition	Constant variance of the errors (residuals) across all levels of the independent variables.	Variance of the errors (residuals) changes across the levels of the independent variables.
Error Distribution	Errors are uniformly spread and have a constant spread regardless of the predictor values.	Errors display a non-constant spread—may increase or decrease as predictor values change.
Visual Representation (Residual Plot)	Residuals are randomly scattered around zero with no discernible pattern.	Residuals show a funnel shape (e.g., widening or narrowing), indicating changing variance.
Assumption in Linear Regression	One of the key assumptions in classical linear regression (OLS) for valid hypothesis testing and confidence intervals.	Violates linear regression assumptions, leading to inefficient, biased standard errors and invalid inference.
Impact on Model	Coefficient estimates are unbiased and standard errors are reliable.	Coefficient estimates remain unbiased, but standard errors are biased → hypothesis tests (p-values) become unreliable.
How to Detect	- Plot residuals vs. fitted values. - Statistical tests: Breusch-Pagan test, White test.	Same as above, but presence of patterns or systematic variance change indicates heteroscedasticity.
Remedies	No action needed if assumption holds.	- Apply transformation (e.g., log, square root) of dependent variable. - Use heteroscedasticity-robust standard errors (White's robust SE). - Apply weighted least squares regression.