R Formula Cheatsheet

Main Terms and Special Operators

- `+` : add a variable — `~ x1 + x2` → include x1 and x2

- `-` : remove a variable — `~ x1 + x2 - x1` → only x2

- `:` : interaction only — `~ x1:x2` → include only x1×x2

- `*` : main effects + interaction — `~ x1 * x2` → includes x1, x2, and x1:x2

- `^` : include all interactions up to given order — `~ (x1 + x2 + x3)^2`

- `I()` : treat expression as-is — `~ I(x1^2)` → squared term

- `.` : all other variables — `y ~ .` → all columns except y

- `0` or `-1` : remove intercept — `~ 0 + x1 + x2`

Common Formula Examples

- **Additive model**
  `y ~ x1 + x2 + x3`

- **Interaction between two variables**
  `y ~ x1 * x2` # same as `y ~ x1 + x2 + x1:x2`

- **Only the interaction term**
  `y ~ x1:x2`

- **Quadratic term**
  `y ~ x1 + I(x1^2)`

- **Multiple interactions**
  `y ~ x1 * x2 * x3`

- **Up to two-way interactions**
  `y ~ (x1 + x2 + x3)^2`

- **No intercept**
  `y ~ 0 + x1 + x2`

- **Use all variables automatically**
  `y ~ .`

Tip: Use `model.matrix(~ formula, data)` to see how variables are expanded in design matrices.