

R Formula Cheatsheet

Main Terms and Special Operators

- `+` : add a variable — `~ x1 + x2` → include x_1 and x_2
- `-` : remove a variable — `~ x1 + x2 - x1` → only x_2
- `:` : interaction only — `~ x1:x2` → include only $x_1 \times x_2$
- `*` : main effects + interaction — `~ x1 * x2` → includes x_1 , x_2 , and $x_1:x_2$
- `^` : 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

- **Only main effects**
`~ x1 + x2 + x3`
- **Main effects and interactions**
`~ x1 * x2` # same as `~ x1 + x2 + x1:x2`
- **Only the interaction**
`~ x1:x2`
- **Quadratic term**
`~ x1 + I(x1^2)`
- **All main effects and all two-way interactions**
`~ (x1 + x2 + x3)^2`
- **Up to three-way interactions**
`~ x1 * x2 * x3`
- **No intercept**
`~ 0 + x1 + x2`
- **Use all variables automatically**
`~ .`

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