An introduction to GAM(M)s

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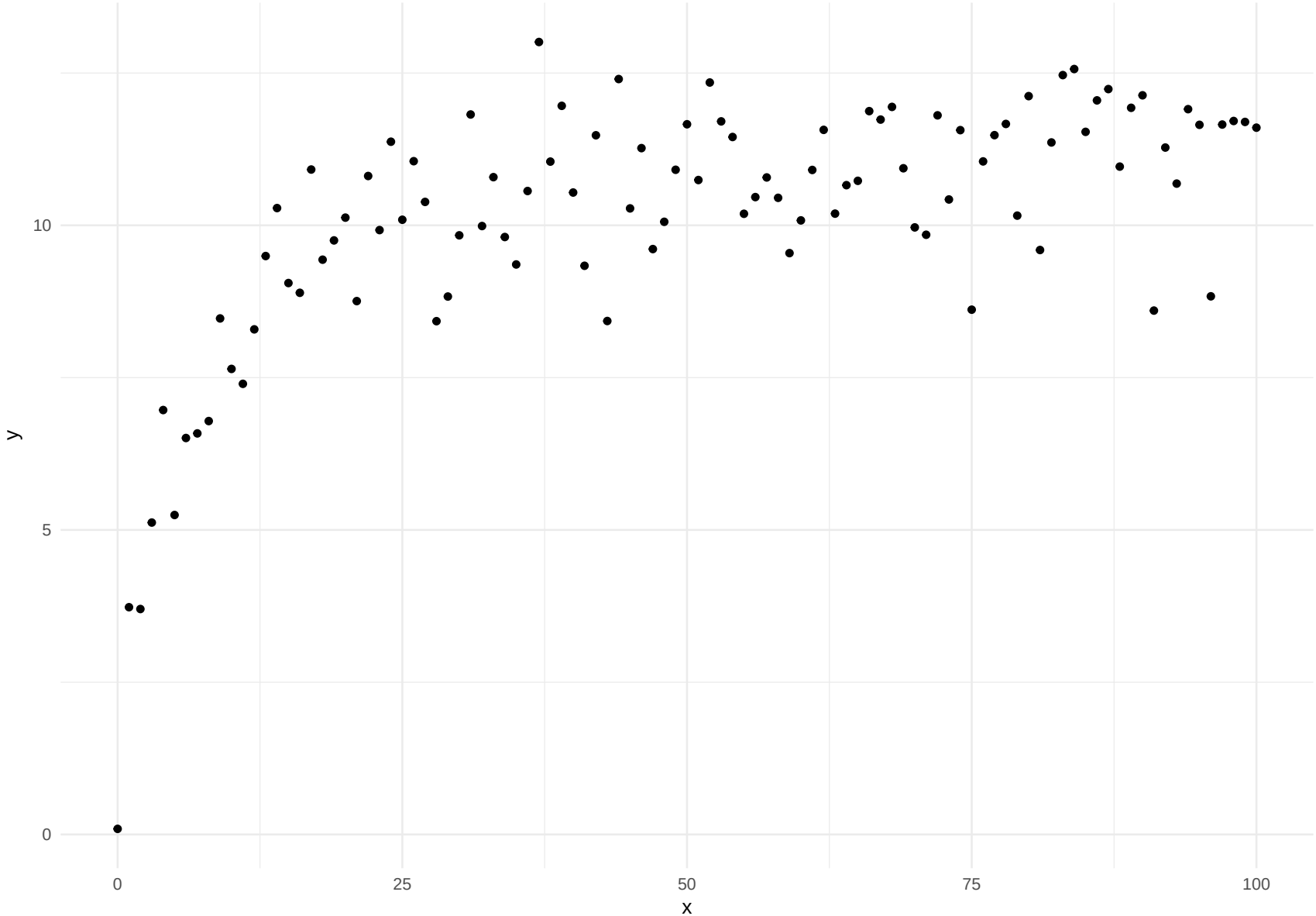
Linear models

Some (fairly) linear data...



Linear models

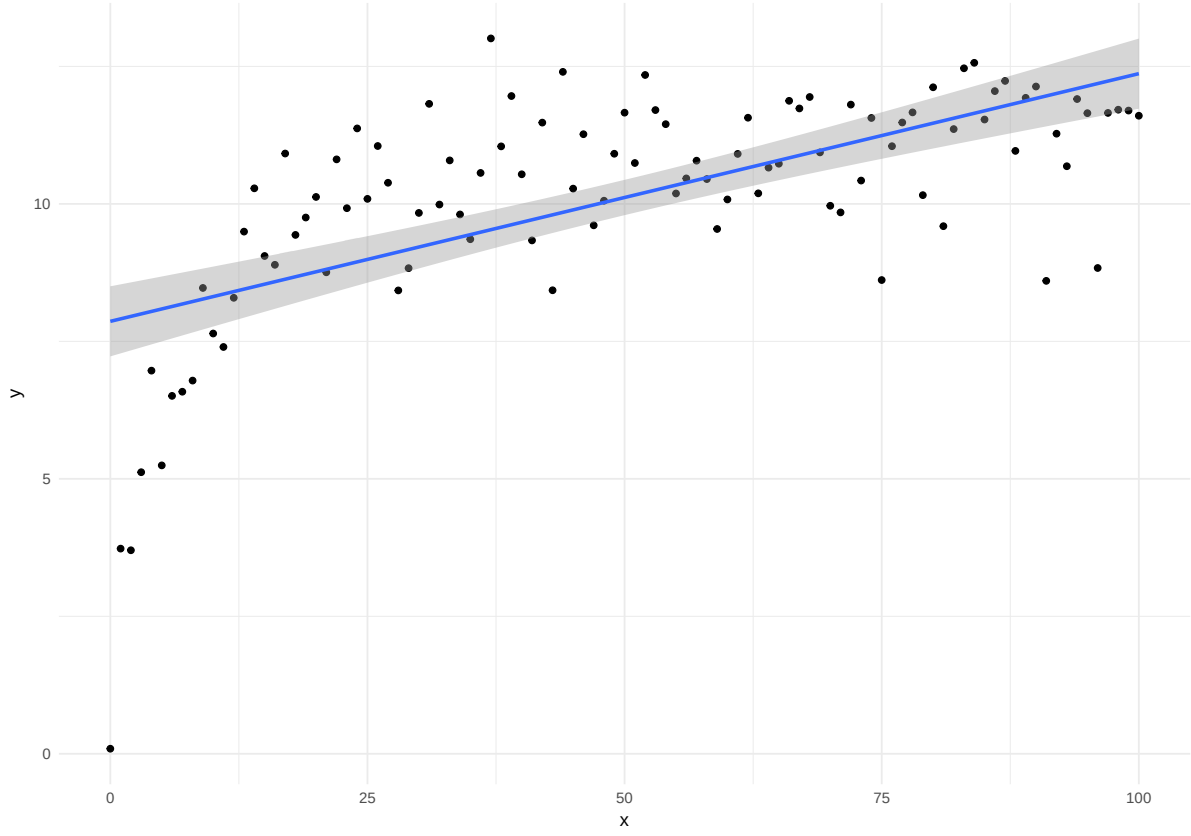
- A general formula: $y = \beta_0 + \beta_1 x$
  - y is the **outcome variable**
  - x is the **predictor**
  - β_0 is the **intercept**
  - β_1 is the **slope**
- We know x and y
  - we need to estimate β_0, β_1
- We can add more predictors
  - $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n$

Linear models

- code in R

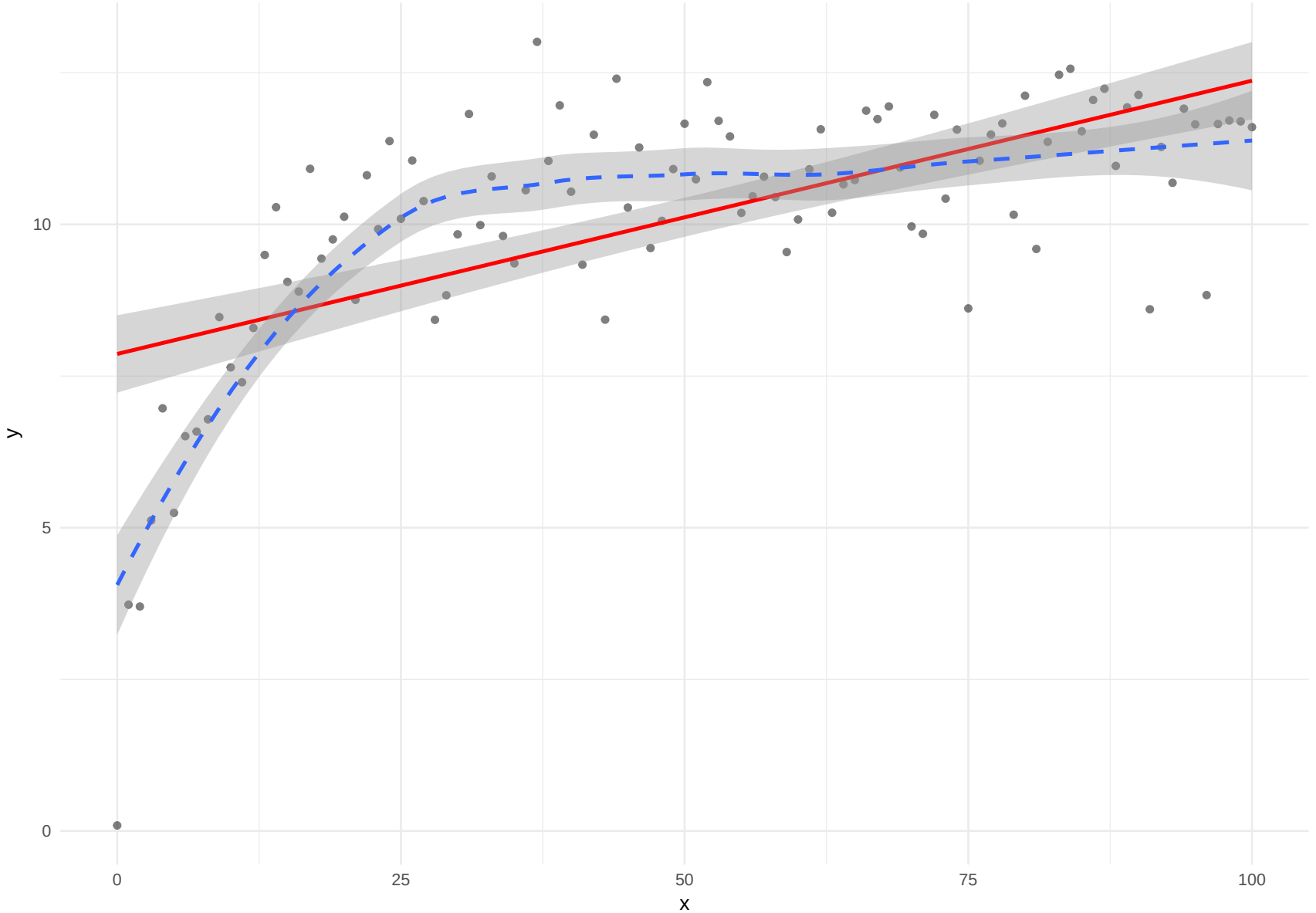
```
lm(y ~ x, data = sim_traj)
```

- estimated intercept and slope



Linear models

Is it linear?

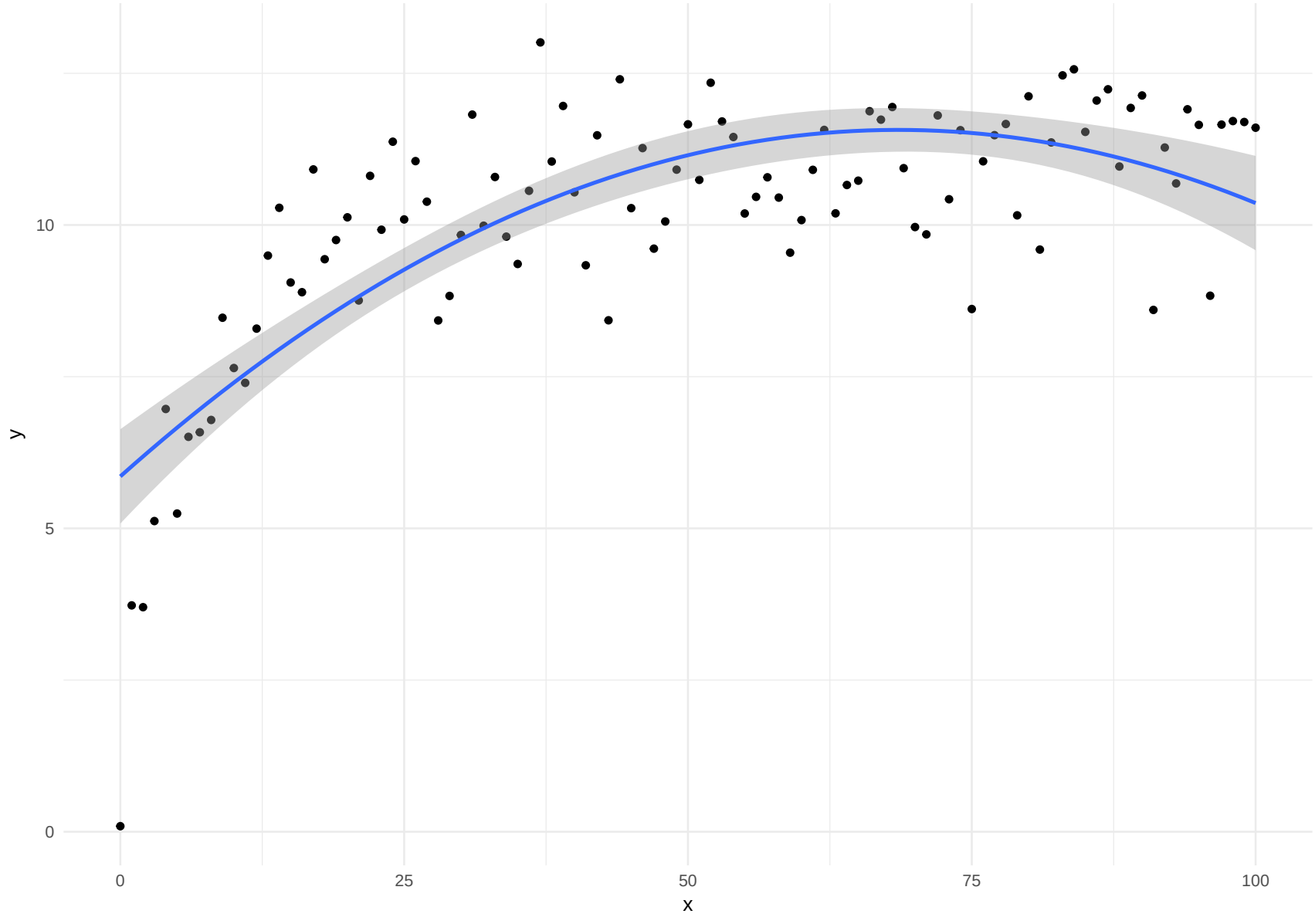


Linear models with non-linear data

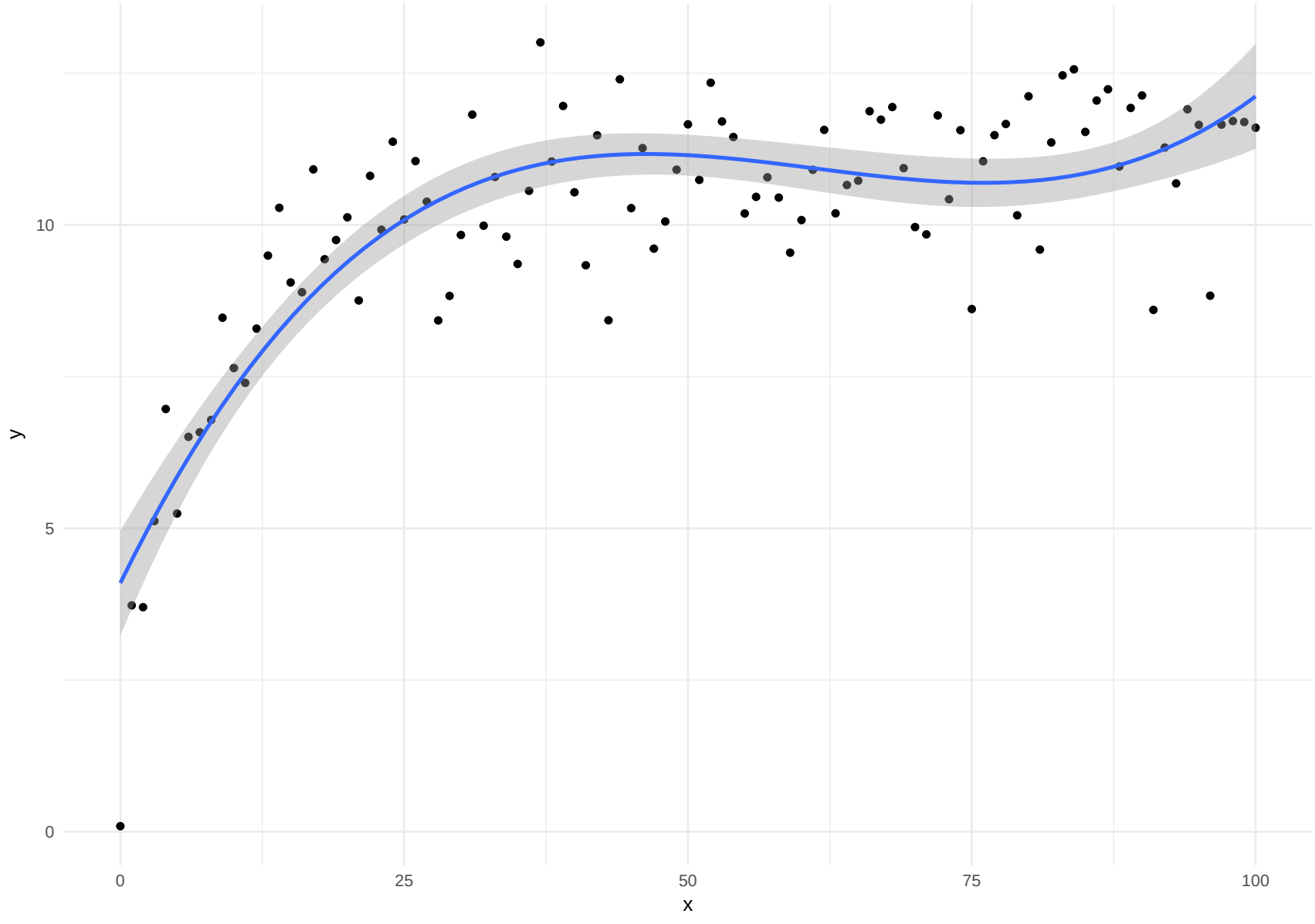
How to account for non-linearity in a linear model?

- Use **higher-degree polynomials**
  - quadratic: $y = \beta_0 + \beta_1 x + \beta_2 x^2$
  - cubic: $y = \beta_0 + \beta_1 x + \beta_2 x^2 + \beta_3 x^3$
  - nth: $y = \beta_0 + \beta_1 x + \beta_2 x^2 + \beta_3 x^3 + ... + \beta_n x^n$

Linear models with non-linear data



Linear models with non-linear data



Linear models with non-linear data