「ガウス過程と機械学習」

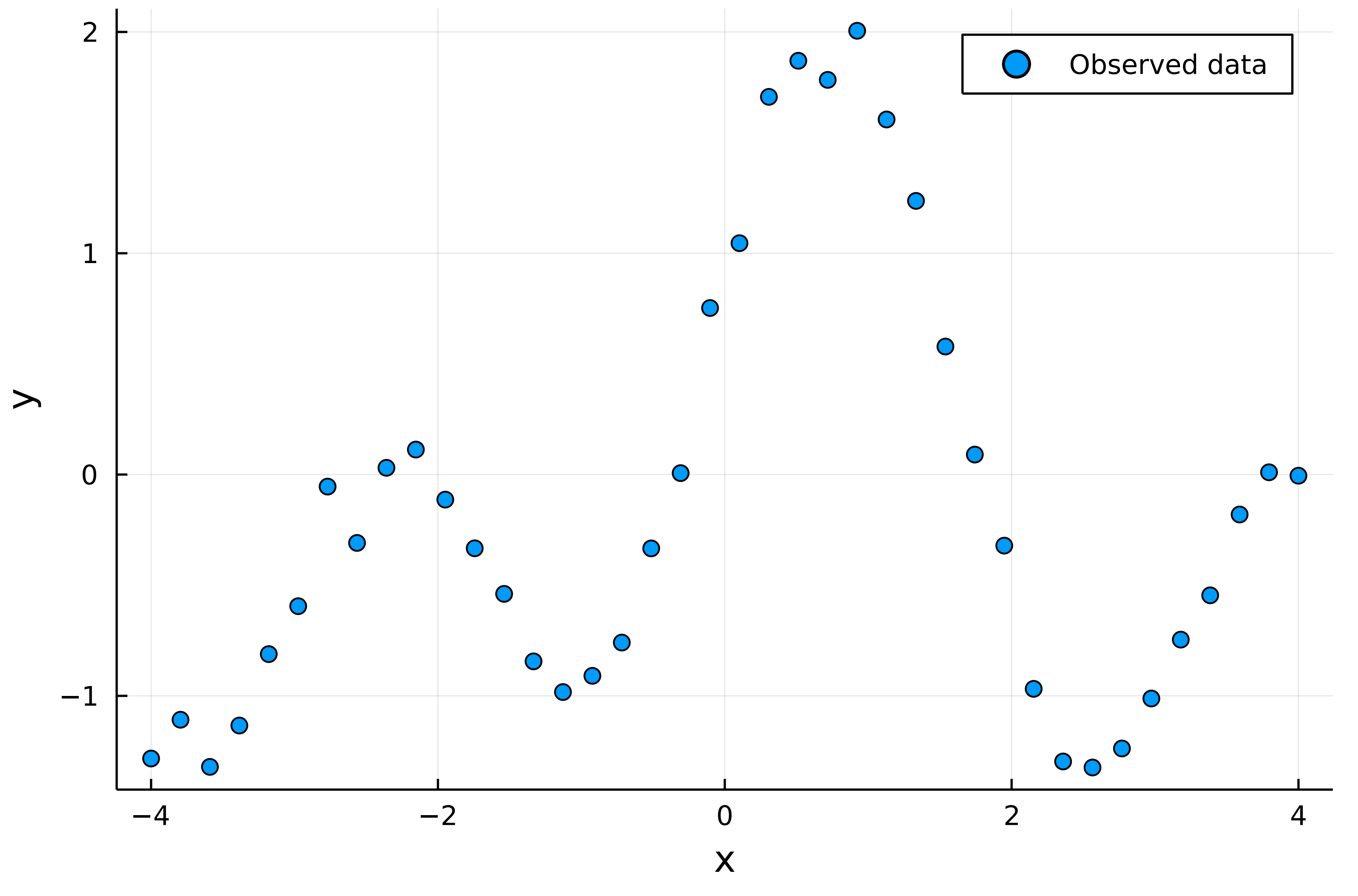
P.81 ガウス過程回帰

In [1]:
```
using LinearAlgebra
using Plots
```

観測データの生成

In [2]:
```
N = 40
x_train = range(-4, 4, length=N)
f(x) = sin(2x) + cos(x-π/5) + 0.1 * randn()
y_train = f.(x_train)
scatter(x_train, y_train, xlab="x", ylab="y", label="Observed data")
```

Out[2]:



パラメータの設定

In [3]:
```
θ = rand(3)
θ₁, θ₂, θ₃ = θ
```

Out[3]:
```
3-element Vector{Float64}:
 0.9312686010495987
 0.7877613526010105
 0.14108273887509437
```

ガウスカーネル関数を定義

In [4]:
```
k(x1, x2, θ₁, θ₂, θ₃) = θ₁ .* exp.(-(x1' .- x2).^2 ./ θ₂) + θ₃ .* (x1' .== x2)
```

Out[4]:
```
k (generic function with 1 method)
```

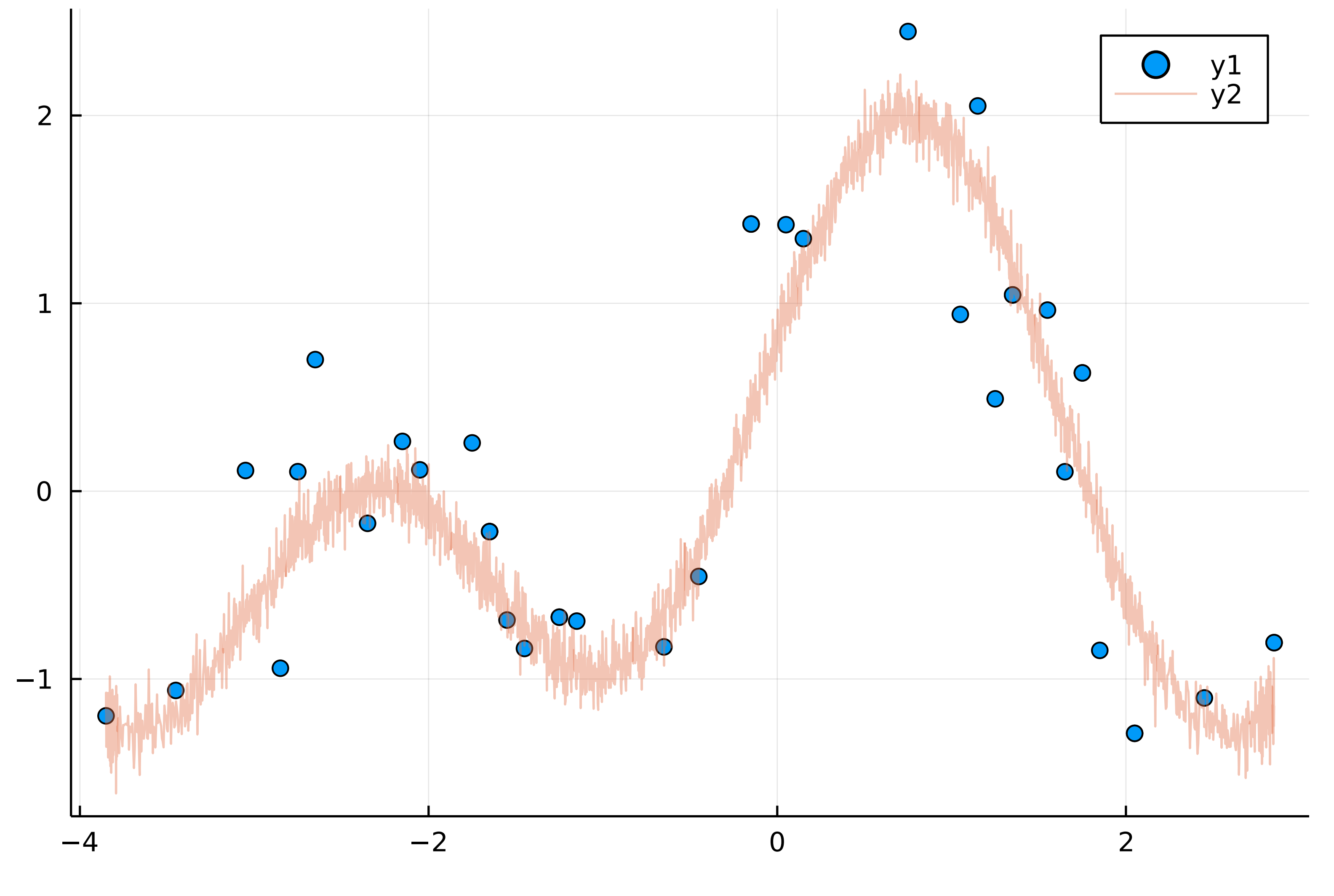
ガウス過程回帰を計算

In [5]:
```
x_test = rand((-4+0.05):0.1:4, 40)
K = k(x_train, x_train, θ₁, θ₂, θ₃)
k_ = k(x_test, x_train, θ₁, θ₂, θ₃)
k__ = k(x_test, x_test, θ₁, θ₂, θ₃)

invK = inv(K)
Σ̂ = k__ - k_' * invK * k_
μ̂ = k_' * invK * y_train

ŷ = μ̂ + real(√Σ̂) * randn(length(x_test))
scatter(x_test, ŷ)
plot!(f, alpha=0.4)
```

Out[5]:



In [ ]: