R code

```
library(glmnet)

# Generate the data
set.seed(202105)
x <- runif(20) # covariates
err <- rnorm(20, sd=0.25)
y <- x + err

X <- model.matrix(y~poly(x,10))[,-1]

# Fit polynomial of order 10
poly10 <- lm(y~X)
poly10.005 <- glmnet(X, y, alpha=0, lambda=0.05)
poly10.02 <- glmnet(X, y, alpha=0, lambda=0.2)
poly10.05 <- glmnet(X, y, alpha=0, lambda=0.5)


newx <- seq(min(x),max(x),length=50)
newX <- poly(newx,10)

predict.poly10 <- predict(poly10, newdata=list(X=newX))
predict.poly10.005 <- predict(poly10.005, newx=newX)
predict.poly10.02 <- predict(poly10.02, newx=newX)
predict.poly10.05 <- predict(poly10.05, newx=newX)

plot(x,y, pch=16, ylim=range(predict.poly10),
     main="Fit polynomial of order 10")
points(newx,predict.poly10, type="l", col="blue", lwd=2)
points(newx,predict.poly10.005, type="l", col="green", lwd=2)
points(newx,predict.poly10.02, type="l", col="red", lwd=2)
points(newx,predict.poly10.05, type="l", col="purple", lwd=2)
```