Curve Fitting :

```
seed <- 1809
set.seed(seed)
gen_data <- function(n, beta, sigma_eps) {
  eps <- rnorm(n, 0, sigma_eps) #Random generation for normal distribution where n is the no of obs, 0 is mean and sigma_eps is std dev
  x <- sort(runif(n, 0, 100)) #Uniform Distribution function with lower and upper limits
  X <- cbind(1, poly(x, degree = (length(beta) - 1), raw = TRUE)) #Combines data by columns
  y <- as.numeric(X %*% beta + eps) #Generic function for numeric values

  return(data.frame(x = x, y = y))
}
require(splines) #Splines is a package
n_rep <- 100
n_df <- 30
df <- 1:n_df
beta <- c(5, -0.1, 0.004, -3e-05)
n_train <- 50
n_test <- 10000
sigma_eps <- 0.5
xy <- res <- list()
xy_test <- gen_data(n_test, beta, sigma_eps) #Generates dataset from regression model
for (i in 1:n_rep) {
  xy[[i]] <- gen_data(n_train, beta, sigma_eps)
  x <- xy[[i]][, "x"]
  y <- xy[[i]][, "y"]
  res[[i]] <- apply(t(df), 2, function(degf) lm(y ~ ns(x, df = degf)))
}
x <- xy[[1]]$x
X <- cbind(1, poly(x, degree = (length(beta) - 1), raw = TRUE))
y <- xy[[1]]$y
plot(y ~ x, col = "gray", lwd = 2)

lines(x, fitted(res[[1]][[4]]), lwd = 3, col = "darkred")
```

OUTPUT: