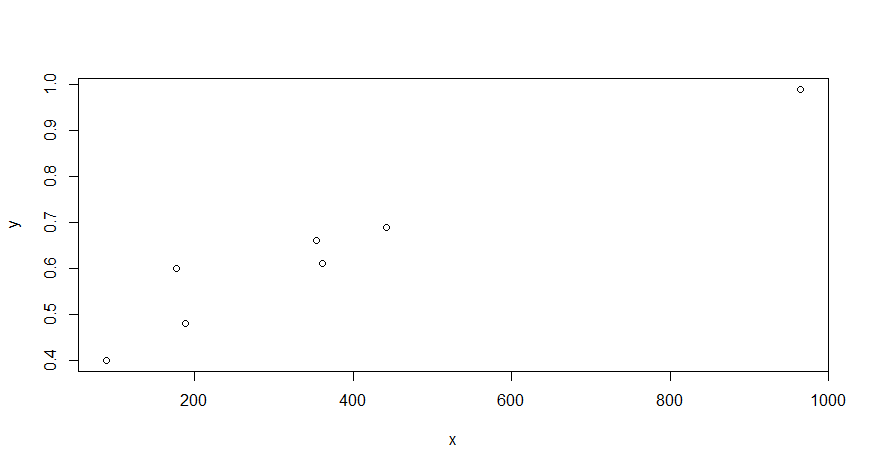
x = c(89, 177, 189, 354, 362, 442, 965)

y = c(.40, .60, .48, .66, .61, .69, .99)

# a)

plot(x, y)



# b)

model = lm(y ~ x)

model$coefficients

# > model$coefficients

# (Intercept) x

# 0.4041237853 0.0006210758

# As the fluid flow velocity for a 5% soluble oil changed by 1 cm/sec,

# the extent of mist droplets will change by 0.0006210758 unit

# c)

summary(model)

# S\_e = residual error = 0.05405

# The typical deviation of the extent of mist droplets about the fit

# is about 0.05405

# d)

beta\_hat = model$coefficients[2]

df = length(x) - 2 # df = 5

t = 2.571 # From table IV

s\_e = 0.05405

s\_xx = sum((x - mean(x)) ^ 2)

c(beta\_hat - t\* s\_e/sqrt(s\_xx), beta\_hat + t\* s\_e/sqrt(s\_xx))

# CI at 95%: (0.0004261986, 0.0008159531)

# We are 95% confident to say that the true average change in mist

# associated with 1 cm/sec increase in velocity is between

# (0.0004261986, 0.0008159531).

# e)

x\_1 = 250

y\_hat = beta\_hat \* x\_1 + model$coefficients[1]

df = length(x) - 2 # df = 5

t = 2.571 # From table IV

s\_e = 0.05405

s\_xx = sum((x - mean(x)) ^ 2)

c(y\_hat - t \* s\_e \* sqrt(1 / length(x) + (x\_1 - mean(x)) / s\_xx),

y\_hat + t \* s\_e \* sqrt(1 / length(x) + (x\_1 - mean(x)) / s\_xx))

# CI at 95%: (0.5069126, 0.6118729)

# We are 95% confident to say that the true value of the extent of mist droplets

# when the fluid velocity is at 250 m/sec is between (0.5069126, 0.6118729)

# d)

x\_2 = 250

y\_hat = beta\_hat \* x\_1 + model$coefficients[1]

df = length(x) - 2 # df = 5

t = 2.571 # From table IV

s\_e = 0.05405

s\_yhat = s\_e \* sqrt(1 / length(x) + (x\_2 - mean(x)) / s\_xx)

c(y\_hat - t \* sqrt(s\_yhat ^ 2 + s\_e ^ 2), y\_hat + t \* sqrt(s\_yhat ^ 2 + s\_e ^ 2))

# PI at 95%: (0.4108506, 0.7079348)

# At 95% prediction level, plausible values for a single observation on the extent

# of mist droplets when the fluid velocity is at 250 m/sec, are between (0.4108506, 0.7079348)