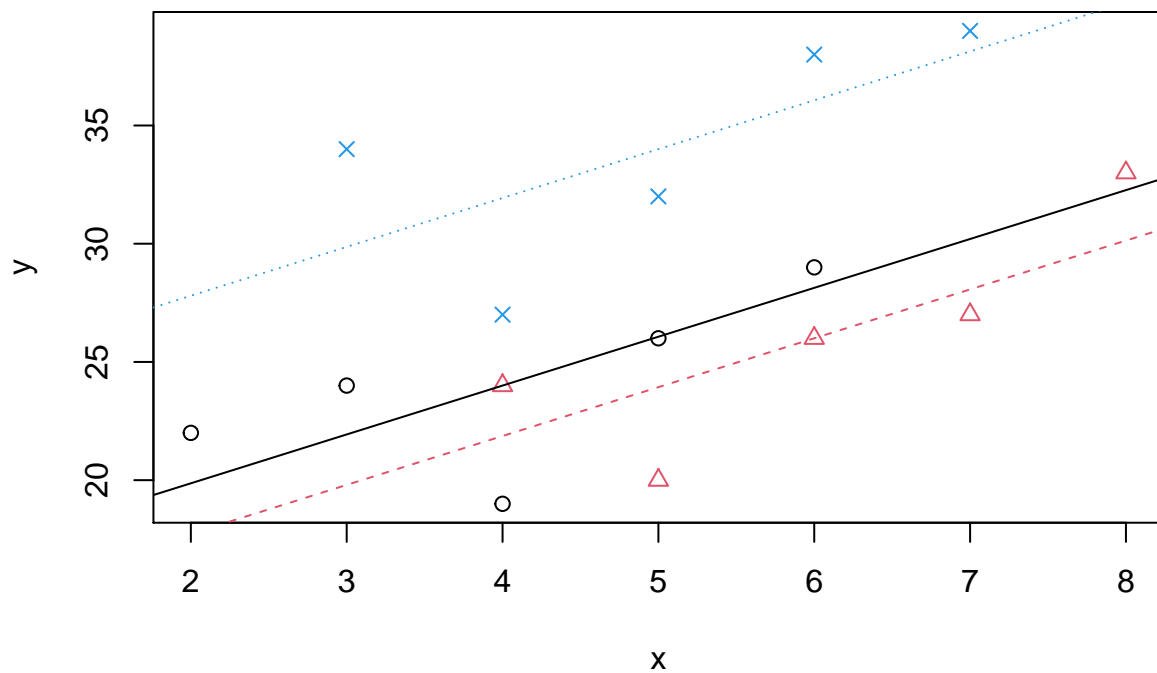


```

y = c(20, 24, 27, 26, 33, 27, 38, 32, 39, 34, 22, 24, 19, 26, 29)
x = c(5, 4, 7, 6, 8, 4, 6, 5, 7, 3, 2, 3, 4, 5, 6)
v1 = c(1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
v2 = c(0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0)
fit = lm(y~x+v1+v2)
plot(x, y, col = 1+v1+3*v2, pch = 1+v1+3*v2 )
abline(fit$coeff[1], fit$coeff[2], col=1, lty=1)
abline(fit$coeff[1]+fit$coeff[3], fit$coeff[2], col=2, lty=2)
abline(fit$coeff[1]+fit$coeff[4], fit$coeff[2], col=4, lty=3)

```



(b)

```

fit1 = lm(y~x+v1+v2)
summary(fit1)

```

```

##
## Call:
## lm(formula = y ~ x + v1 + v2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5.0000 -1.5333  0.8667  2.1000  4.1333
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   15.7333     2.7552   5.710 0.000136 ***
## x              2.0667     0.5874   3.518 0.004813 **

```

```
## v1          -2.1333      2.3496  -0.908 0.383370
## v2           7.9333      2.1179   3.746 0.003234 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.217 on 11 degrees of freedom
## Multiple R-squared:  0.7819, Adjusted R-squared:  0.7224
## F-statistic: 13.14 on 3 and 11 DF,  p-value: 0.0005877
```

```
anova(lm(y~1), fit1)
```

```
## Analysis of Variance Table
##
## Model 1: y ~ 1
## Model 2: y ~ x + v1 + v2
##   Res.Df    RSS Df Sum of Sq      F    Pr(>F)
## 1      14 522.00
## 2      11 113.87  3    408.13 13.143 0.0005877 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

(c)

```
fit2 = lm(y~x)
anova(fit2, fit1)
```

```
## Analysis of Variance Table
##
## Model 1: y ~ x
## Model 2: y ~ x + v1 + v2
##   Res.Df    RSS Df Sum of Sq      F    Pr(>F)
## 1      13 392.40
## 2      11 113.87  2    278.53 13.454 0.001108 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

(d)

```
summary(fit1)
```

```
##
## Call:
## lm(formula = y ~ x + v1 + v2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5.0000 -1.5333  0.8667  2.1000  4.1333
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  15.7333      2.7552   5.710 0.000136 ***
## x              2.0667      0.5874   3.518 0.004813 **
## v1           -2.1333      2.3496  -0.908 0.383370
## v2              7.9333      2.1179   3.746 0.003234 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 3.217 on 11 degrees of freedom
## Multiple R-squared:  0.7819, Adjusted R-squared:  0.7224
## F-statistic: 13.14 on 3 and 11 DF,  p-value: 0.0005877
```

(e)

```
new = data.frame(v1=0, v2=1, x=2)
predict(fit,new,interval="prediction", level=0.95)
```

```
##      fit      lwr      upr
## 1 27.8 19.12709 36.47291
```