homework09

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```
level <- c(9,10,9,8,9,8,8,8,7,6,9,10,11,9,10,11,
           11,11,11,10,11,12,13,12,13,12,14,15,14,12,13,13,
           12,13,13,13,13,13,10,8,9,8,6,7,7,6,5,6,
           5,6,4,5,4,4,2,4,5,4,5,6,5,5,6,5,
           6,7,8,8,8,7,9,10,9,10,9,8,9,8,7,7,
           8,7,7,7,8,8,8,8,7,6,5,6,5,6,7,6,
           6,5,6,6,5,4,3,4,5,5,6,5,6,7,6,5)
n = 16 * 7 - 3

y = rep(1,n+1)

for (i in 1:n){
  y1 = level[i]
  y2 = level[i+1]
  y3 = level[i+2]
  y4 = level[i+3]
  y[i] = (y1 + y2) / 2 - (y3 + y4) / 2
}

y[n+1] = (8 + 6) / 2 - (3 + 4) / 2

x1 = rep(1,n+1)
x1[n+1] = 2
x2 = 0:n+1

anova(lm(y~x1))
```

```
## Analysis of Variance Table
##
## Response: y
##            Df  Sum Sq Mean Sq F value   Pr(>F)
## x1          1  11.697 11.6973  8.8312 0.003651 **
## Residuals 108 143.050  1.3245
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(lm(y~x1+x2))
```

```
## Analysis of Variance Table
##
## Response: y
```

```
##            Df  Sum Sq Mean Sq F value   Pr(>F)
## x1          1  11.697 11.6973  8.7502 0.003811 **
## x2          1   0.013  0.0134  0.0100 0.920491
## Residuals 107 143.037  1.3368
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(lm(y~x1+x2+x1*x2))
```

```
## Analysis of Variance Table
##
## Response: y
##            Df  Sum Sq Mean Sq F value   Pr(>F)
## x1          1  11.697 11.6973  8.7502 0.003811 **
## x2          1   0.013  0.0134  0.0100 0.920491
## Residuals 107 143.037  1.3368
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```