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HW8 Stat 318

4/8/19

1)

b)

```
> qt(1-.05/2,158-2)
[1] 1.975288
```

2)

c)

```
> qt(1-.10/2, 57-2)
[1] 1.673034
```

3)

d)

```
> qt(1-.05/2,55-2)
[1] 2.005746
```

4)

a)

Length= 4.27729 - .86235(Bites)

σ^2 = .769655

```
> cookie.data= read.delim( "clipboard", header= T)
> attach(cookie.data)
> cookie.mod= lm(Length ~ Bites)
> summary(cookie.mod)

Call:
lm(formula = Length ~ Bites)

Residuals:
    Min      1Q  Median      3Q     Max 
-2.5526 -0.4149 -0.0149  0.2227  4.7227 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  4.27729    0.11795   36.27   <2e-16 ***
Bites       -0.86235    0.04953  -17.41   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
Residual standard error: 0.8773 on 144 degrees of freedom
Multiple R-squared:  0.678,	Adjusted R-squared:  0.6757
F-statistic: 303.2 on 1 and 144 DF,  p-value: < 2.2e-16
```

b)

Ho: B1= 0

Ha: B1 =/ 0

Tc= -17.41

P= < 2E-16

Interpretation: If the length of the cookie and the number of bites is not linearly related (B1=0), we would expect to see data like ours, or more extreme, 2E-14 percent of the time.

Conclusion: There is very strong evidence in favor of the alternative hypothesis that the length of the cookie and number of bites is linearly related (B1 =/ 0)

c)

CI= [-.9602468, -.07644585]

We are 95% confident that with each bite of the cookie (one bite increase), the expected length in cookie changes by between -.9602468 and -.07644585.

```
> confint(cookie.mod, parm="Bites", conf.level= .95)
           2.5 %     97.5 %
Bites -0.9602468 -0.7644585
```

d)

CI 0 Bites= [4.0441635, 4.5104205]

CI 1 Bite= [3.2477205, 3.5821581]

CI 2 Bites= [2.408566, 2.6966070]

We are 95% confident that the length of a cookie with 2 bites taken out of it is between 2.408566 and 2.6966070.

```
> predict(cookie.mod, newcookiedata=data.frame (Bites= c(0,1,2)), interval= "
confidence", level=.95)
           fit        lwr       upr
1   4.27729198  4.0441635  4.5104205
2   3.41493932  3.2477205  3.5821581
3   2.55258666  2.4085663  2.6966070
```

5)

a)

Conductivity= 21.68384 + 1.27117 (Temperature)

*temp is in deg C

σ^2 = .0048776

```
> water.data= read.delim("clipboard", header = T)
> attach(water.data)
> water.mod= lm(Conductivity ~ Temperature)
> summary(water.mod)

Call:
lm(formula = Conductivity ~ Temperature)

Residuals:
      Min        1Q    Median        3Q       Max 
-0.221717 -0.029799  0.005071  0.027507  0.137561 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept) 21.68384    0.63982   33.89   <2e-16 ***
Temperature  1.27117    0.02926   43.45   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.06984 on 53 degrees of freedom
Multiple R-squared:  0.9727,	Adjusted R-squared:  0.9722 
F-statistic:  1888 on 1 and 53 DF,  p-value: < 2.2e-16
```

b)

We are 95% confident that as the temperature increases by 1 degree Celsius , the expected change in water conductivity is between 1.212481 and 1.32985.

```
> confint( water.mod, parm="Temperature", conf.level= .95)
               2.5 %  97.5 %
Temperature 1.212481 1.32985
```

c)

```
> predict(water.mod, newdata=data.frame(Temperature= 18), interval="predictio
n", level=.95)
       fit      lwr      upr
1 44.56482 44.29753 44.83212
```

d)

We are 95% confident that the conductivity of the water in 18 deg Celsius water is between 44.29753 and 44.83212.