2.2)
No, to test whether if there is linear association or not, the null hypothesis would have $\beta_1$ equal to 1.
2.4)
a) (00540,.07226)
b) H0: β1 = 0, Ha: β1 ≠ 0. t*= 3.04072. t* higher than 2.61814 so reject the null
c) .00291, since p value is small it supports our conclusion

c. 0.00291
2.10)
a) Predticion interval (future)
b) Confidence interval (average)
c) Prediction interval (future)

2.13)
a) ( 3.0614,3.3410), 95% confident the GPA of a freshmen whose ACt score is 28 falls between here
b) (1.9594, 4.4430)
c) Yes and yes
d) (3.0262,3.3762), yes, yes

2.17)
Greater than .033. If the alpha level had been .01, there would not be enough evidence to reject the null.
2.18)
The t-test can test one sided alternatives
2.21)
No, in a regression model there is no implication that Y necessarily depends on X
2.23)
a)

| Source | SS | df | MS |
|---|---|---|---|
| Regression | 3.58785 | 1 | 3.58785 |
| Error | 45.8176 | 118 | 0.388285 |
| Total | 49.40545 | 119 | |

b) when β1 = 0
c) H0: β1 = 0, Ha: β1 6= 0. F*=9.24, F = 6.855. Since F* is greater than F, reject the null
d) 3.58785, 0.0726, coefficient of determination
e) 0.2695
f) R^2

2.30)
a) H0: β1 = 0, Ha: β1 ≠ 0. t* = −4.1029, t = 2.63712. Since |t* | is greater than t, reject the null. P-value = 0.000096
b) (−280.2114,−60.9386), 99% confident β1 falls in within this interval.

2.31)
a) Source SS df MS

| | | | |
|---|---|---|---|
| Regression | 93,462,942 | 1 | 93,462,942 |
| Error | 455,273,165 | 82 | 5,552,112 |
| Total | 548,736,107 | 83 | |

b) H0: β1 = 0, Ha: β1≠ 0. F* = 16.8338, F = 6.9544. Since F* is greater than F, reject the null. t* is equal to F*. Yes
c) SSR = 93, 462, 942, 17.03% or 0.1703
d) -0.4127

2.39)
Normal with mean 50 and sd 3
3)

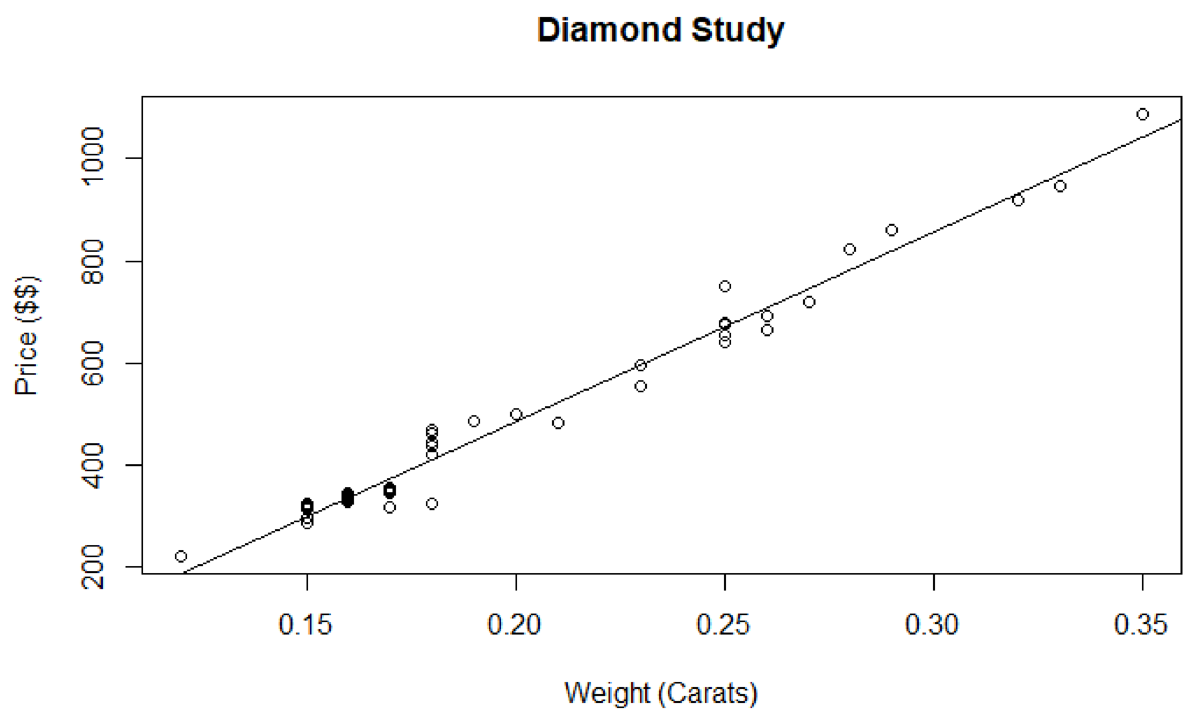
```
> diamonds=read.table(d,header = TRUE)
> Diamonds=diamonds[-49,]
> Diamonds
     W    P
1  0.17  355
2  0.16  328
3  0.17  350
4  0.18  325
5  0.25  642
6  0.16  342
7  0.15  322
8  0.19  485
9  0.21  483
10 0.15  323
11 0.18  462
12 0.28  823
13 0.16  336
14 0.20  498
15 0.23  595
16 0.29  860
17 0.12  223
18 0.26  663
19 0.25  750
20 0.27  720
21 0.18  468
22 0.16  345
23 0.17  352
24 0.16  332
25 0.17  353
26 0.18  438
27 0.17  318
28 0.18  419
29 0.17  346
```

```
30 0.15  315
31 0.17  350
32 0.32  918
33 0.32  919
34 0.15  298
35 0.16  339
36 0.16  338
37 0.23  595
38 0.23  553
39 0.17  345
40 0.33  945
41 0.25  655
42 0.35 1086
43 0.18  443
44 0.25  678
45 0.25  675
46 0.15  287
47 0.26  693
48 0.15  316
> Diamond=Diamonds[order(W),]
> Diamond
      W    P
17 0.12  223
7  0.15  322
10 0.15  323
30 0.15  315
34 0.15  298
46 0.15  287
48 0.15  316
2  0.16  328
6  0.16  342
13 0.16  336
22 0.16  345
24 0.16  332
35 0.16  339
36 0.16  338
1  0.17  355
3  0.17  350
23 0.17  352
25 0.17  353
27 0.17  318
29 0.17  346
31 0.17  350
39 0.17  345
```

```
4  0.18  325
11 0.18  462
21 0.18  468
26 0.18  438
28 0.18  419
43 0.18  443
8  0.19  485
14 0.20  498
9  0.21  483
15 0.23  595
37 0.23  595
38 0.23  553
5  0.25  642
19 0.25  750
41 0.25  655
44 0.25  678
45 0.25  675
18 0.26  663
47 0.26  693
20 0.27  720
12 0.28  823
16 0.29  860
32 0.32  918
33 0.32  919
40 0.33  945
42 0.35 1086
> plot(Diamond[,1], Diamond[,2], main="Diamond Study", xlab="Weight (Carats)"
+      , ylab="Price ($$)")
> abline(lm.out)
> lm.out=lm(P ~ W, data = Diamond)
> summary(lm.out)

Call:
lm(formula = P ~ W, data = Diamond)

Residuals:
    Min      1Q  Median      3Q     Max
-85.159 -21.448  -0.869  18.972  79.370

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  -259.63      17.32  -14.99   <2e-16 ***
W            3721.02      81.79   45.50   <2e-16 ***
---
```

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 31.84 on 46 degrees of freedom
Multiple R-squared:  0.9783,  Adjusted R-squared:  0.9778
F-statistic:  2070 on 1 and 46 DF,  p-value: < 2.2e-16




4)
B0=0
B1=b1

5)
Population_model = lm(Physicians ~ Population)
Bed_model = lm(Physicians ~ Population)
Income_model = lm(Physicians ~ Population)

R2=c(“Population” = summary(Population_model)$r.square,
“Beds” = summary(Bed_model)$r.square,
“Income”=summary(Income_model)$r.square)
R2

| Population | Beds | Income |
|---|---|---|
| 0.8840674 | 0.9033826 | 0.8989137 |

Beds