e. Based on your answer in (c), predict the GPA of a student who scored 20 on the ACT.
Y=2.11405+0.03883*20=2.11405+0.7766=2.8906

f. Based on your answer to (c), find *e*1, *e*2, and *e*3 (the residuals for the first three observations).
E1=3.897-(2.11405+0.03883*21)=0.96752
E2=3.885-(2.11405+0.03883*14)=1.22733
E3=3.778-(2.11405+0.03883*28)=0.57671

g. Find $\overline{X}$ and $\overline{Y}$. Using your answer to (c), what is the predicted GPA for a student whose ACT score is equal to $\overline{X}$?
X-bar is the mean of act=24.725 and y bar is the mean of gpa=3.07405
And gpa=2.11405+0.03883*24.725=3.07412

```
  Q2 code
> seven <- c(2300, 3390, 2430, 2890, 3330, 2480, 3380, 2660, 2620, 3340)
> mean(seven)
[1] 2882
> var(sevem)
Error in is.data.frame(x) : object 'sevem' not found
> var(seven)
[1] 193240
> twentyeight <- c(4070, 5220, 4640, 4620, 4850, 4120, 5020, 4890, 4190, 4630)
>
> mean(twentyeight)
[1] 4625
> var(twentyeight)
[1] 153716.7
> cor(seven,twentyeight)
[1] 0.7584091
> plot(twentyeight~seven, xlab='seven', ylab='twentyeight', main ='Problem (c)',sub='Raylor')

> regmodel <- lm(twentyeight~seven)
> summary((regmodel))

Call:
lm(formula = twentyeight ~ seven)

Residuals:
   Min     1Q  Median     3Q    Max
-304.80 -215.14  -44.22  203.07  415.16

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 2675.5619   598.4958   4.470  0.00208 **
seven          0.6764     0.2055   3.291  0.01100 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 271 on 8 degrees of freedom
Multiple R-squared:  0.5752,  Adjusted R-squared:  0.5221
F-statistic: 10.83 on 1 and 8 DF,  p-value: 0.011
res=regmodel$residuals
> res<regmodel$residuals
   1    2    3    4    5    6    7    8    9   10
```

```
FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
> hist(res, freq = FALSE, main='Q2 h) Histogram of residuals with density curve',sub='raylor')
> lines(density(res))
>
```

Code for q 3

```
humerus <- c(24.8,24.59,24.59,24.29,23.81,24.87,25.9,26.11,26.63,26.31,26.84)
> mean(humerus)
[1] 25.34
> var(humerus)
[1] 1.08424
tibia <- c(36.05,35.57,35.57,34.58,34.2,34.73,37.38,37.96,37.46,37.75,38.5)
> mean(tibia)
[1] 36.34091
> var(tibia)
[1] 2.315329
cor(tibia,humerus)
[1] 0.9513161
> r <- lm(tibia~humerus)
> summary(r)

Call:
lm(formula = tibia ~ humerus)

Residuals:
    Min      1Q  Median      3Q     Max
-0.95753 -0.15759  0.07383  0.27172  0.54866

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   1.1140     3.8073   0.293    0.776
humerus       1.3902     0.1501   9.260 6.76e-06 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.4944 on 9 degrees of freedom
Multiple R-squared:  0.905,    Adjusted R-squared:  0.8944
F-statistic: 85.74 on 1 and 9 DF,  p-value: 6.762e-06
res<-=regmodel$residuals
Error: unexpected '=' in "res<-="
> res<regmodel$residuals
   1    2    3    4    5    6    7    8    9   10
FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
> hist(res, freq = FALSE, main='Q2 h) Histogram of residuals with density curve',sub='raylor')
> lines(density(res))
> humerus <- c(24.8,24.59,24.59,24.29,23.81,24.87,25.9,26.11,26.63,26.31,26.84)
> tibia <- c(36.05,35.57,35.57,34.58,34.2,34.73,37.38,37.96,37.46,37.75,38.5)
> r <- lm(tibia~humerus)
> res=r$residuals
> res<r$residuals
   1    2    3    4    5    6
FALSE FALSE FALSE FALSE FALSE FALSE
   7    8    9   10   11
FALSE FALSE FALSE FALSE FALSE
> hist(res, freq = FALSE, main='Q3 g) Histogram of residuals with density curve',sub='raylor')
> > lines(density(res))
Error: unexpected '>' in ">"
>  lines(density(res))
```

Q4code

```
> gpa <- c(3.897, 3.885, 3.778, 2.540, 3.028, 3.865, 2.962, 3.961, 0.500,3.178, 3.310, 3.538, 3.083, 3.013, 3.245, 2.963,
3.522, 3.013, 2.947,2.118, 2.563, 3.357, 3.731, 3.925, 3.556, 3.101, 2.420, 2.579, 3.871,3.060, 3.927, 2.375, 2.929,
```

```
3.375, 2.857, 3.072, 3.381, 3.290, 3.549,3.646, 2.978, 2.654, 2.540, 2.250, 2.069, 2.617, 2.183, 2.000, 2.952,3.806,
2.871, 3.352, 3.305, 2.952, 3.547, 3.691, 3.160, 2.194, 3.323 ,3.936, 2.922, 2.716, 3.370, 3.606, 2.642, 2.452, 2.655,
3.714, 1.806, 3.516, 3.039, 2.966, 2.482, 2.700, 3.920, 2.834, 3.222, 3.084, 4.000, 3.511, 3.323, 3.072, 2.079, 3.875,
3.208, 2.920, 3.345, 3.956, 3.808, 2.506, 3.886, 2.183, 3.429, 3.024, 3.750, 3.833, 3.113, 2.875, 2.747, 2.311, 1.841,
1.583, 2.879, 3.591, 2.914, 3.716, 2.800, 3.621, 3.792,  2.867, 3.419, 3.600, 2.394, 2.286, 1.486, 3.885, 3.800, 3.914,
1.860, 2.948)
> act <- c(21, 14, 28, 22, 21, 31, 32, 27, 29, 26, 24, 30, 24, 24, 33, 27, 25, 31, 25, 20, 24, 21, 28, 27, 28, 26, 28, 22, 26,
21, 25, 16, 28, 26, 22, 24,21, 30, 27, 26, 26, 30, 24, 26, 29, 24, 31, 15, 19, 18, 27, 16, 27, 26, 24, 30, 21, 20, 30, 29, 25,
23, 25, 23, 30, 21, 24, 32, 18, 23, 20, 23, 18,18,29, 20, 23, 26, 28, 34, 20, 20, 26, 32, 25, 27, 27, 29, 19, 21, 24, 27,
25,18, 29, 24, 27, 21, 19, 18,  25, 18, 20, 32, 24, 35, 25, 28, 28, 25, 22, 30, 20, 20, 31, 20, 29, 28, 16, 28)
> plot(gpa~act, xlab='act', ylab='gpa', main ='Problem 4a',sub='Raylor')
> abline(lm(gpa~act))
> plot(gpa~act, xlab='act', ylab='gpa', main ='Problem 4b',sub='Raylor')
> abline(lm(gpa~act))
> regmodel=(lm(gpa~act))
> summary(regmodel)

Call:
lm(formula = gpa ~ act)

Residuals:
    Min      1Q  Median      3Q
-2.74004 -0.33827  0.04062  0.44064
    Max
 1.22737

Coefficients:
            Estimate Std. Error
(Intercept)  2.11405    0.32089
act          0.03883    0.01277
            t value Pr(>|t|)
(Intercept)   6.588  1.3e-09 ***
act           3.040  0.00292 **
---
Signif. codes:
  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05
  ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.6231 on 118 degrees of freedom
Multiple R-squared:  0.07262,              Adjusted R-squared:  0.06476
F-statistic:  9.24 on 1 and 118 DF,  p-value: 0.002917

> mean(act)
[1] 24.725
> mean(gpa)
[1] 3.07405
```