1. a)

```
> gadilijiang = function(X)
+ {a= X[,1] * X[,1]
+ b = X[,2] * a
+ c = sum(b)
+ return(c)
+ }
```

b)

```
> X1 = cbind( c(2,4,6,8), c(0.1,0.2,0.4,0.3) )
> gadilijiang(X1)
[1] 37.2
> X2 = cbind( c(0,3,6,9,12), c(0.20,0.10,0.30,0.15,0.25) )
> gadilijiang(X2)
[1] 59.85
```

2.

```
> x = c(0,12,24,36,48,60,72)
> y = c(141,127,141,163,145,179,161)
```

a)

```
> fit = lm(y ~ x)
> fit

Call:
lm(formula = y ~ x)

Coefficients:
(Intercept)            x
      133.0          0.5
```

b)

```
> fit$fitted.values
  1   2   3   4   5   6   7
133 139 145 151 157 163 169
```

c)

```
> fit$residuals
  1   2   3   4   5   6   7
  8 -12  -4  12 -12  16  -8
> sum(fit$residuals)
[1] 8.881784e-16
```

d)

```
> summary(fit)$sigma
[1] 12.89961
```

e) Multiple R-squared

```
> summary(fit)$r.squared
[1] 0.5478261
```

OR

```
> N = length(x)
> SYY = sum((y-mean(y))^2); SYY
[1] 1840
> R2 = 1- sum(fit$residuals^2)/SYY; R2
[1] 0.5478261
```

Adjusted R-squared

```
> Radj2 = 1- (sum(fit$residuals^2)/(N-2))/(SYY/(N-1)); Radj2
[1] 0.4573913
```

f) & g)

```
> summary(fit)

Call:
lm(formula = y ~ x)

Residuals:
  1   2   3   4   5   6   7
  8 -12  -4  12 -12  16  -8

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 133.0000     8.7896  15.132 2.28e-05 ***
x             0.5000     0.2031   2.461   0.0571 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 12.9 on 5 degrees of freedom
Multiple R-squared:  0.5478,   Adjusted R-squared:  0.4574
F-statistic: 6.058 on 1 and 5 DF,  p-value: 0.05714
```

h) & i)

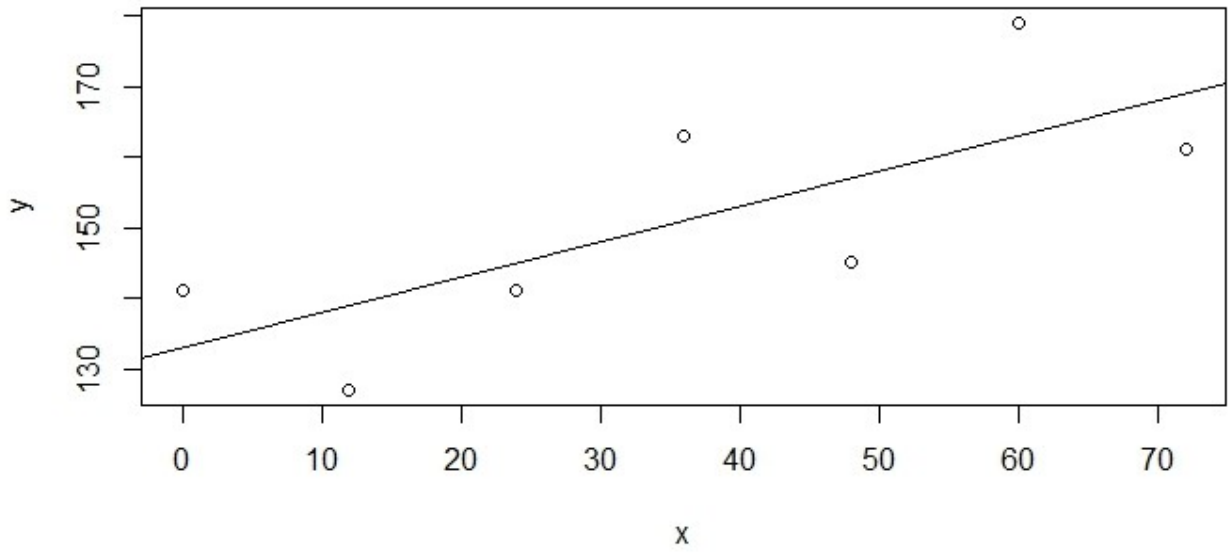
```
> confint(fit, level=0.95)
                   2.5 %     97.5 %
(Intercept) 110.40560297 155.594397
x            -0.02221319   1.022213
```

j) & k)

```
> new <- data.frame(x=136)
> predict.lm(fit,new,interval=c("confidence"),level=0.90)
  fit      lwr      upr
1 201 158.9019 243.0981
> predict.lm(fit,new,interval=c("prediction"),level=0.90)
  fit      lwr      upr
1 201 151.5237 250.4763
```

l)

```
> plot(x,y)
> abline(fit$coefficients)
```



3.

a)-c) see next page

d)

```
> x <- c(0.7,0.5,0.9,1.1,1.5,1.3)
> y <- c(7.0,4.8,12.0,14.0,18.4,14.9)
> fit = lm(y ~ 0+x)
> plot(x,y)
> abline(a=0, b=fit$coefficients)
```