Assignment:

Dataset

	weight	price
1	2	35
2	4	60
3	5	20
4	3	50
5	6	50
6	5	55
7	7	60

	x	y	xy	x^2
1	2	35	70	4
2	4	60	240	16
3	5	20	100	25
4	3	50	150	9
5	6	50	300	36
6	5	55	275	25
7	7	60	420	49

$x = 32$ $y = 330$ $x^2 = 164$

$\bar{x} = 32/7$ $\bar{y} = 330/7$ $(\bar{x^2}) = 164/7$

$= 4.571$ $= 47.143$ $= 23.43$

$(\bar{x})^2 = (4.571)^2$ $xy = 1555$

$= 20.89$ $\bar{xy} = 1555/7$

$= 222.143$

predicted y in python:

ext

	$\hat{y}_i$
for1	$\hat{y}_i$
for1	32.857
for3	38.571
for8	52.857
for10	58.571

$\bar{x} = 4.571$

$\bar{y} = 47.143$

$\bar{xy} = 222.142$

$(\bar{x})^2 = 20.894$

$(\bar{x^2}) = 23.43$

$$m = \frac{\bar{x}\cdot\bar{y} - \bar{xy}}{(\bar{x})^2 - (\bar{x^2})}$$

$$= \frac{4.571 * 47.143 - 222.142}{20.894 - 23.43}$$

$$= \frac{-6.651}{-2.536}$$

$\boxed{m = 2.623}$ m = coefficient

reg. coef. ↑

$c = \bar{y} - m\bar{x} = 47.143 - 2.623 * 4.571$

$\boxed{c = 35.153}$

reg. intercept

$y = mx + c =$

for weight = 6; $y = mx + c$

$= 2.623 * 6 + 35.153$

$\boxed{y = 50.891}$

$m = 2.623$

$c = 35.153$

$y = 50.891$

→

Actual y Predicted y $\therefore R = y_i - \hat{y}_i$

	y_i	$\hat{y}_i$	Residuals
1	35	40.399	-5.399
2	60	45.645	14.355
3	20	48.268	-28.268
4	50	43.022	6.978
5	50	50.891	-0.891
6	55	48.268	6.732
7	60	53.514	6.486

$y_i = 330 \quad \hat{y}_i = 330.007$

Mean Absolute Error (MAE)

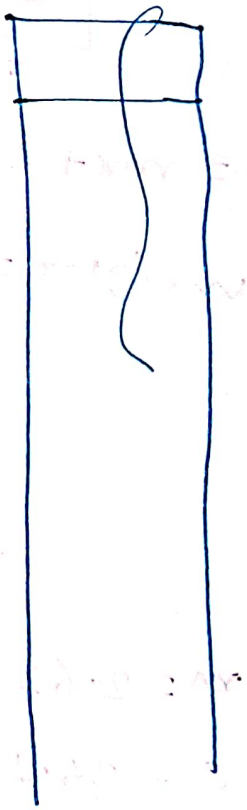
$$MAE = \frac{1}{n} \sum_{i=1}^{n} |y_i - \hat{y}_i|$$

=

Mean squared Error (MSE)

$$MSE = \frac{1}{n} \sum_{i=1}^{n} (y_i - \hat{y}_i)^2$$

=



Mean Absolute Error:

$$MAE = \frac{1}{n}\sum_{i=1}^{n}|y_i - \hat{y}_i|$$

$$= \frac{|-5.399| + 14.355 + |-28.268| + 6.978 + |-0.891| + 6.732 + 6.486}{7}$$

$$= \frac{69.109}{7}$$

$$= 9.872$$

mae = 10.0 in python

Mean squared Error:

$$MSE = \frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2$$

$$= \frac{(-5.399)^2 + (14.355)^2 + (-28.268)^2 + (6.978)^2 + (-0.891)^2 + (6.732)^2 + (6.486)^2}{7}$$

$$= \frac{1171.169}{7}$$

$$= 167.30$$

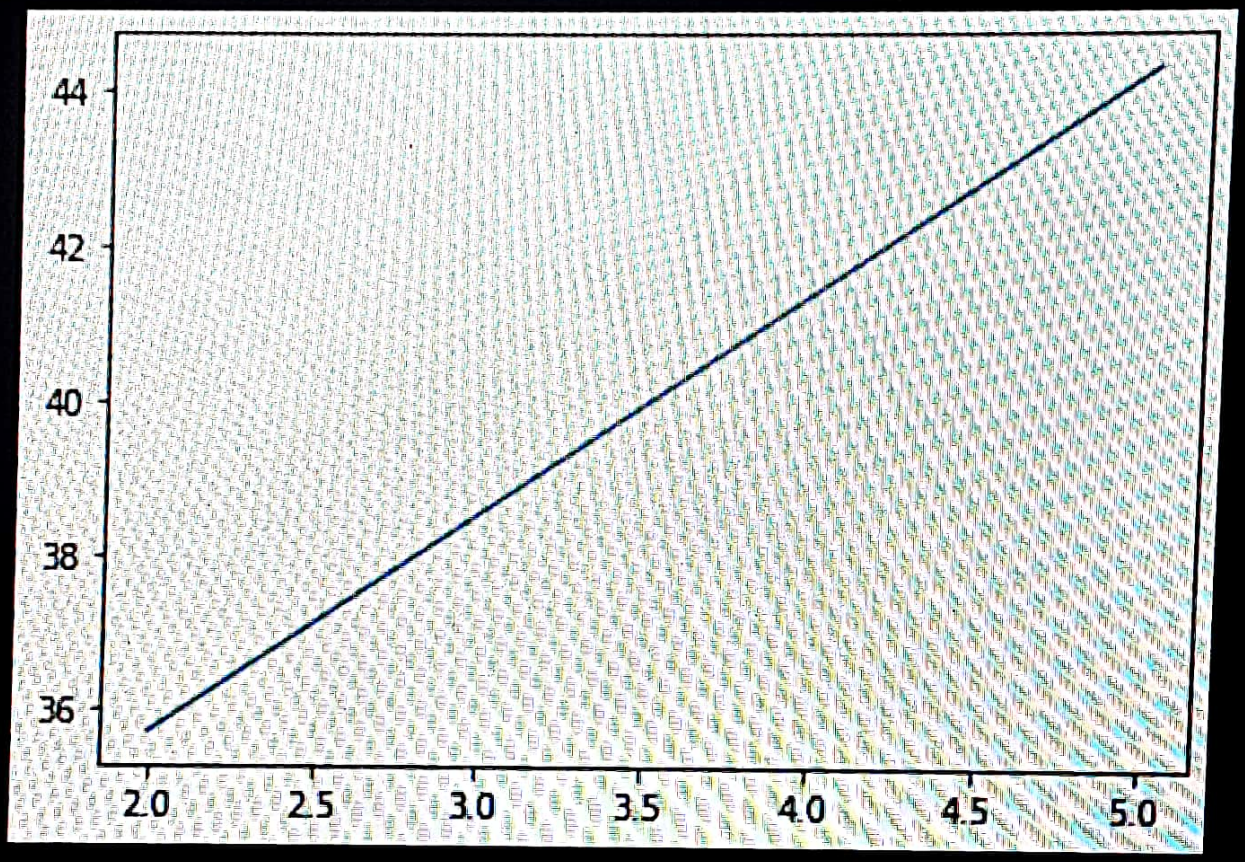
mse: 153.40 in python

```
# Best fit line

plt.plot(xtest,pred)
```

[108]

```
[<matplotlib.lines.Line2D at 0x12245862e60>]
```




```
plt.plot(xtest,pred)
plt.scatter(x,y)
plt.xlabel("weight")
plt.ylabel("price")
```