HW1

HW 0224Q1- C02Q01(a,b,c)

a.

x	y	$x-\bar{x}$	$(x-\bar{x})^2$	$y-\bar{y}$	$(x-\bar{x})(y-\bar{y})$	x^2	y^2	xy
3	4	2	4	2	4	9	16	12
2	2	1	1	0	0	4	4	4
1	3	0	0	1	0	1	9	3
-1	1	-2	4	-1	2	1	1	-1
0	0	-1	1	-2	2	0	0	0
5	10	0	10	0	8	15	30	18

g.

$$\bar{x} = \frac{5}{5} = 1$$

$$\bar{y} = \frac{10}{5} = 2$$

b.

$$b_2 = \frac{8}{10} = 0.8$$

$$b_1 = 2 - 0.8 \times 1 = 1.2$$

c.

$$\sum x^2 - N\bar{x}^2 = 15 - 5 \times 1^2 = 10 = \sum (x-\bar{x})^2$$

$$\sum xy - N\bar{x}\bar{y} = 18 - 5 \times 1 \times 2 = 8 = \sum (x-\bar{x})(y-\bar{y})$$

HW 0224Q1- C02Q01(d)

x	y	$\hat{y}$	$\hat{e}$	$\hat{e}^2$	$x\hat{e}$	$(x-\bar{x})^2$	$(y-\bar{y})^2$	$(x-\bar{x})(y-\bar{y})$
3	4	3.6	0.4	0.16	1.2	4	4	4
2	2	2.8	-0.8	0.64	-1.6	1	0	0
1	3	2	1	1	1	0	1	0
-1	1	0.4	0.6	0.36	-0.6	4	1	2
0	0	1.2	-1.2	1.44	0	1	4	2
5	10	10	0	3.6	0	10	10	8

$$s_y^2 = \frac{10}{5-1} = 2.5$$

$$s_x^2 = \frac{10}{5-1} = 2.5$$

$$s_{xy} = \frac{8}{5-1} = 2$$

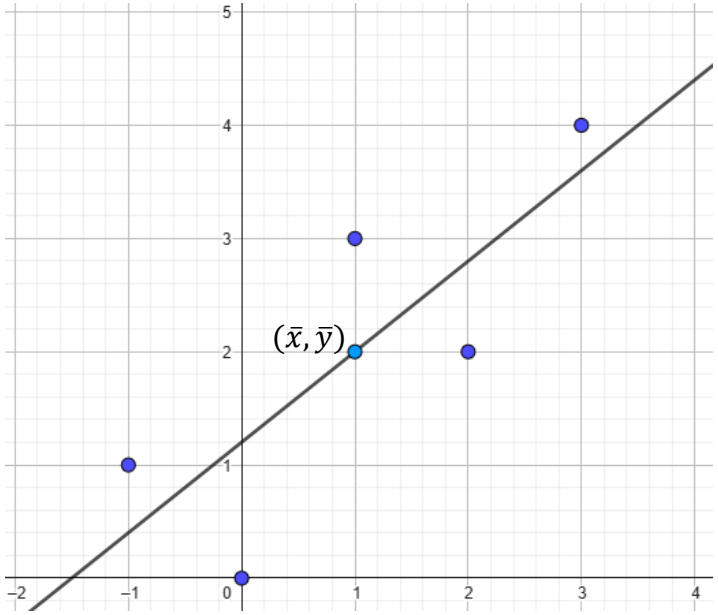
$$r_{xy} = \frac{2}{\sqrt{2.5}\sqrt{2.5}} = 0.8$$

$$CV_x = 100\frac{\sqrt{2.5}}{1} \approx 158.11$$

Median of x = 1

HW 0224Q2- C02Q01(e,f,g)

e. f.



Yes, fitted line pass through $(\bar{x}, \bar{y})$

g.

x	y	$\hat{y}$
3	4	3.6
2	2	2.8
1	3	2
-1	1	0.4
0	0	1.2
5	10	10

$$b_1 + b_2\bar{x} = 1.2 + 0.8 \times \frac{5}{5} = 2 = \frac{10}{5} = \bar{y}$$

HW 0224Q3- C02Q01(h,i,j)

h.

$$\bar{\hat{y}} = \frac{10}{5} = \bar{y}$$

i.

$$\hat{\sigma}^2 = \frac{3.6}{5-2} = 1.2$$

j.

$$\widehat{var}(b_2|x) = \frac{1.2}{10} = 0.12$$

$$se(b_2) = \sqrt{0.12} \approx 0.3464$$

x	y	$\hat{y}$	$\hat{e}$	$\hat{e}^2$	$(x-\bar{x})^2$
3	4	3.6	0.4	0.16	4
2	2	2.8	-0.8	0.64	1
1	3	2	1	1	0
-1	1	0.4	0.6	0.36	4
0	0	1.2	-1.2	1.44	1
5	10	10	0	3.6	10

HW 0224Q4- C02Q14(a,b,c)

a.

$$\overline{EDUC} = \frac{\overline{WAGE}+4.88}{1.80} = \frac{19..74+4.88}{1.80} \approx 13.6778$$

$$\hat{\varepsilon} = 1.80 \times \frac{13.6778}{19.74} \approx 1.2472$$

b.

$$\overline{WAGE} = -10.76 + 2.46\overline{EDUC} = 22.8928$$

$$\hat{\varepsilon} = 2.46 \times \frac{13.68}{22.8928} \approx 1.47$$

$$SE(\hat{\varepsilon}) = \sqrt{(\frac{13.68}{22.8928} \times 0.16)^2 + (\frac{2.46 \times 13.68}{22.8928^2} \times 0)^2} = \frac{13.68}{22.8928} \times 0.16 \approx 0.0956$$

c.

	EDUC = 12y	EDUC = 16y
urban	-10.76+2.46(12) = 18.76	-10.76+2.46(16) = 28.60
rural	-4.88+1.8(12) = 16.72	-4.88+1.8(16) = 23.92

HW 0224Q5- C02Q16(a,b)

a.

If we treat $r_j - r_f$ as dependent variable y

$r_m - r_f$ as independent variable x

CAPM model is similar to a regression model

$y = \alpha + \beta x + e$ α, β are the coefficients b_1, b_2 and e is the error term

b.

	firm	alpha	pvalue	beta
1	GE	-0.0009586682	0.8287072	1.1479521
2	IBM	0.0060525497	0.2122303	0.9768898
3	Ford	0.0037789112	0.7121467	1.6620307
4	Microsoft	0.0032496009	0.5909844	1.2018398
5	Disney	0.0010469237	0.8231091	1.0115207
6	Exxon-Mobil	0.0052835329	0.1368343	0.4565208

Ford appears most aggressive

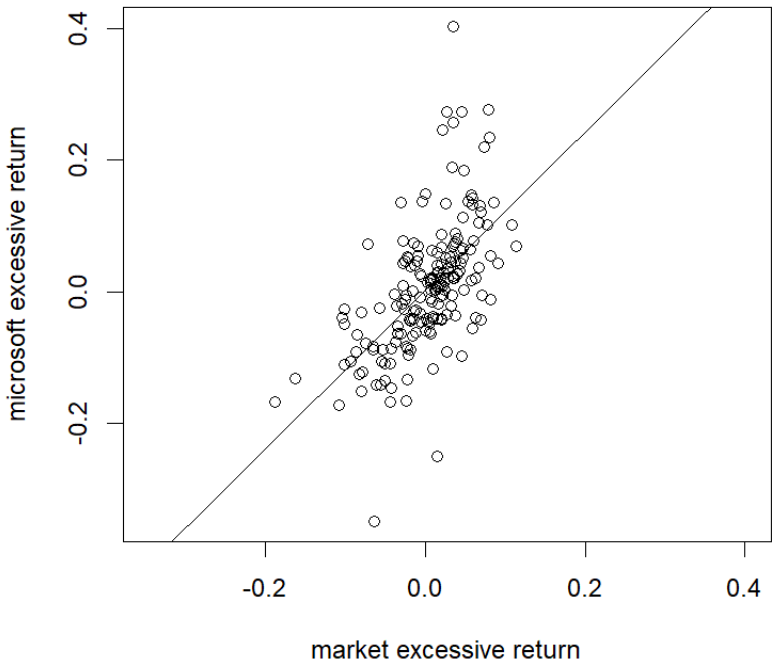
Exxon-Mobil appears most defensive

HW 0224Q6- C02Q16(c)

	firm	alpha	pvalue	beta
1	GE	-0.0009586682	0.8287072	1.1479521
2	IBM	0.0060525497	0.2122303	0.9768898
3	Ford	0.0037789112	0.7121467	1.6620307
4	Microsoft	0.0032496009	0.5909844	1.2018398
5	Disney	0.0010469237	0.8231091	1.0115207
6	Exxon-Mobil	0.0052835329	0.1368343	0.4565208

The p-values of α are greater than 0.05,
there is no enough evidence to prove that $\alpha \neq 0$.
Thus, α should be 0

Microsoft stock regression line



HW 0224Q6- C02Q16(d)

	firm	beta	beta_noalpha	change
1	GE	1.1479521	1.1467633	0.001188808
2	IBM	0.9768898	0.9843954	-0.007505539
3	Ford	1.6620307	1.6667168	-0.004686085
4	Microsoft	1.2018398	1.2058695	-0.004029708
5	Disney	1.0115207	1.0128190	-0.001298251
6	Exxon-Mobil	0.4565208	0.4630727	-0.006551910

β has shown nearly no change(less than 2%)