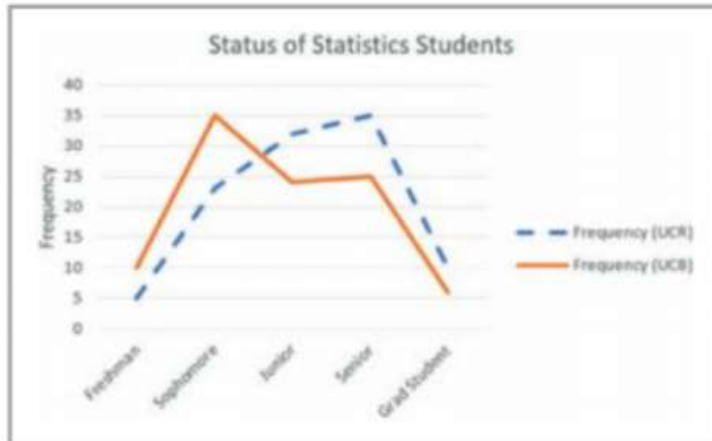# Comparative Line and bar Charts

Data: Status of students in Statistics Class at UCR(105) and UCB(100)

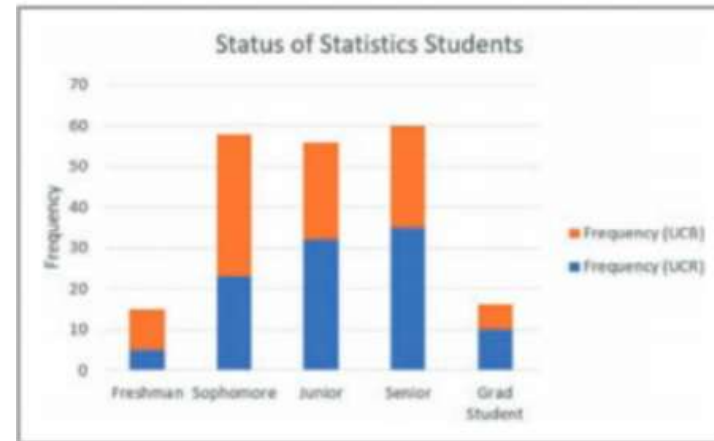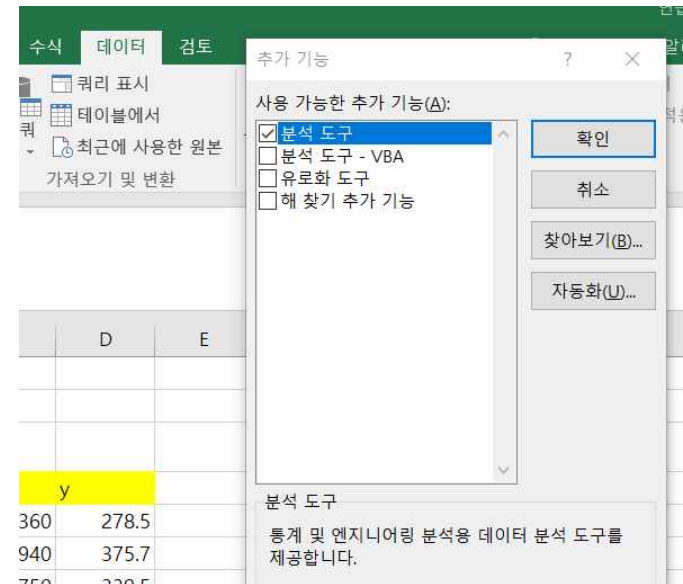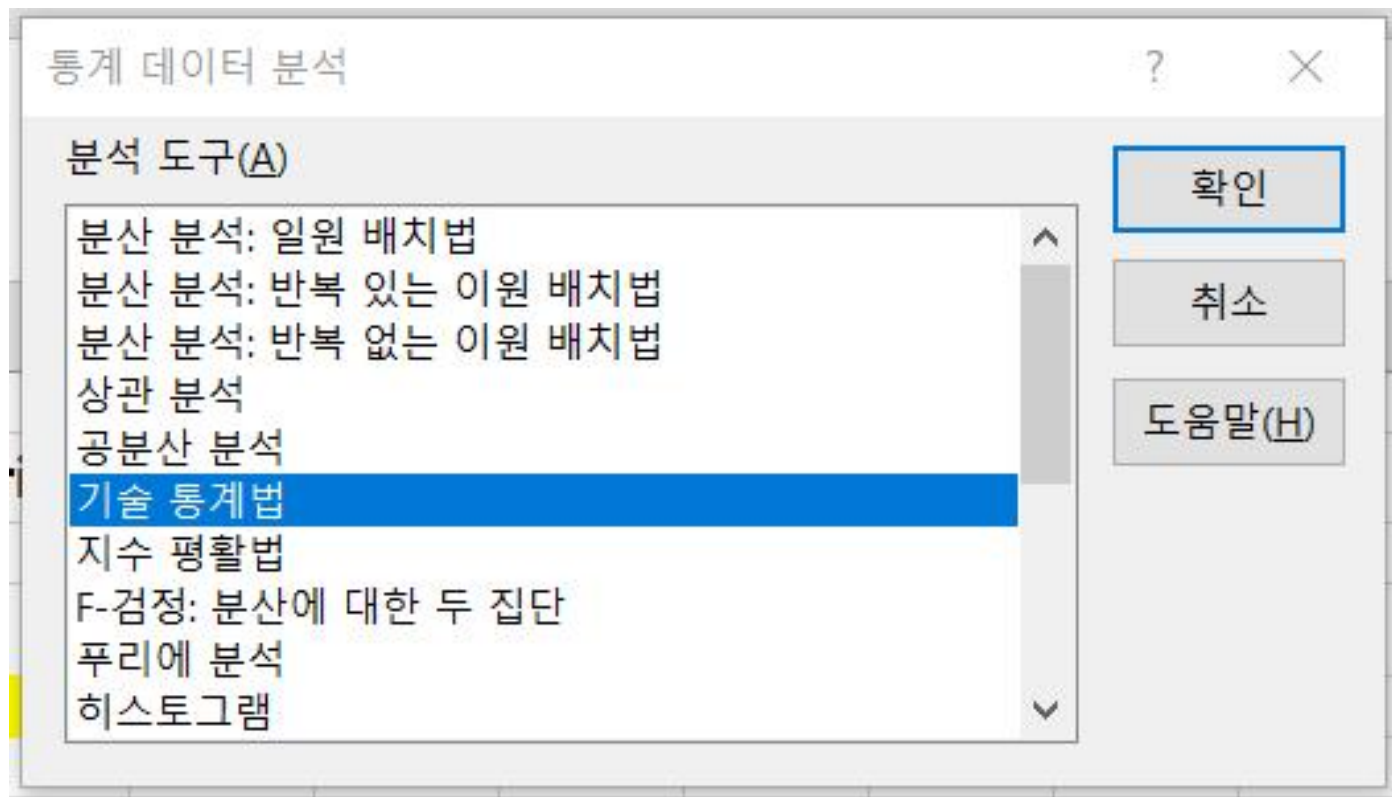|	Freshman	Sophomore	Junior	Senior	Grad Student
Frequency (UCR)	5	23	32	35	10
Frequency (UCB)	10	35	24	25	6

Line chart

Stacked bar chart

Descriptive Statistics

- 통계 분석을 위해 Excel 메뉴를 추가하기 위해서
- " 데이터" 메뉴 에서 Alt + t 를 누르고 나서 " i" 를 누르면 추가 기능이 나타남
- 분석도구를 체크하고 확인
- 메뉴에 "데이터분석" 생성

- 데이터 > 데이터 분석 > 기술통계학 선택

Scatter plot

Data : Living Area and Selling Price of 12 Residence

Residence	x (sq. ft.)	y (in thousands)
1	1360	$278.5
2	1940	375.7
3	1750	339.5
4	1550	329.8
5	1790	295.6
6	1750	310.3
7	2230	460.5
8	1600	305.2
9	1450	288.6
10	1870	365.7
11	2210	425.3
12	1480	268.8
sum	**20,980**	**4043.5**

Scatterplot
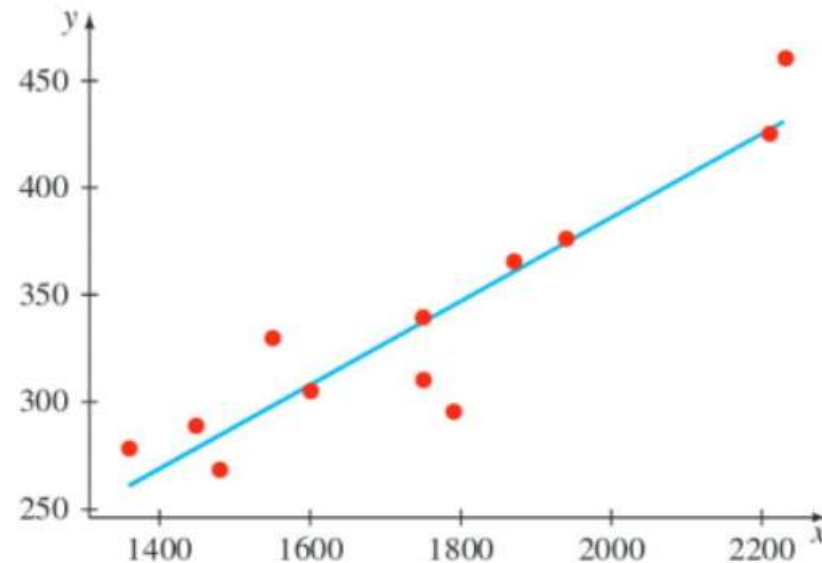
Indicates a positive linear relationship

기술통계량

	x		y	
1	x		y	
2				
3	평균	1748.333333	평균	336.9583333
4	표준 오차	81.25747829	표준 오차	17.25098354
5	중앙값	1750	중앙값	320.05
6	최빈값	1750	최빈값	#N/A
7	표준 편차	281.4841618	표준 편차	59.75915994
8	분산	79233.33333	분산	3571.157197
9	첨도	-0.551894604	첨도	0.167223485
10	왜도	0.506545249	왜도	0.973967285
11	범위	870	범위	191.7
12	최소값	1360	최소값	268.8
13	최대값	2230	최대값	460.5
14	합	20980	합	4043.5
15	관측수	12	관측수	12

Correlation Coefficient

$$\bar{x} = 1748.33 \quad s_x = 281.4842$$
$$\bar{y} = 336.9583 \quad s_y = 59.7592$$

$$s_{xy} = \frac{\sum x_i\, y_i - \frac{(\sum x_i)(\sum y_i)}{n}}{n-1} = \frac{7{,}240{,}383 - \frac{(20{,}980)(4043.5)}{12}}{11} = 15{,}545.19$$
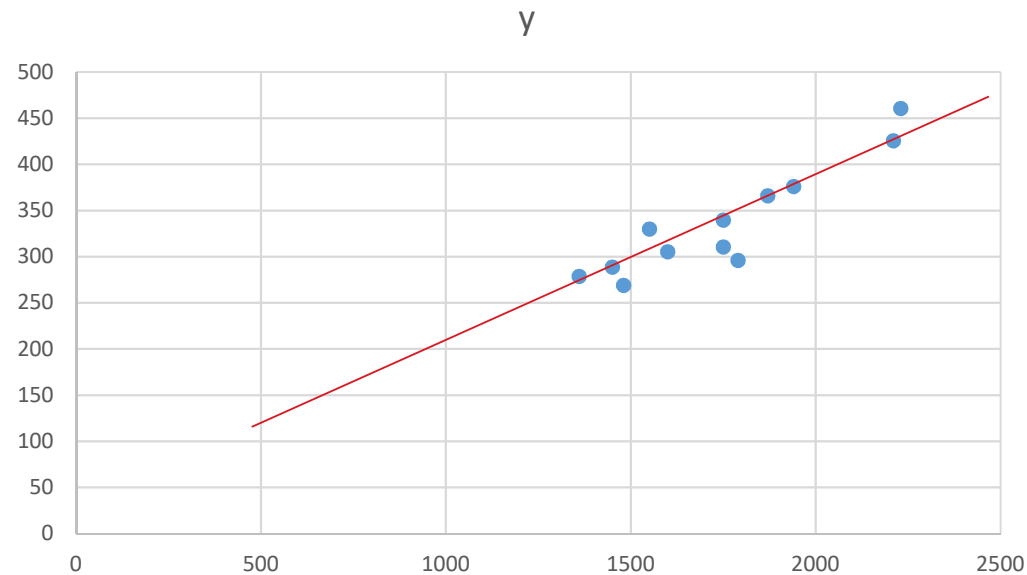
$$r = \frac{s_{xy}}{s_x s_y} = \frac{15{,}545.19}{(281.48)(59.75)} = .9241$$

$$-1 \le r \le 1$$

$$b = r\frac{s_y}{s_x} = (.92414)\frac{59.7592}{281.4842} = 0.196$$

$$a = \bar{y} - b\bar{x} = 336.95 - 0.196 * 1748.33 = -6.05$$

regression line : $\widehat{\boldsymbol{y}} = \boldsymbol{a} + \boldsymbol{bx} = -\boldsymbol{6.05} + \boldsymbol{0.196x}$

Scatter plot

		x	y
6		1360	278.5
7		1940	375.7
8		1750	339.5
9		1550	329.8
10		1790	295.6
11		1750	310.3
12		2230	460.5
13		1600	305.2
14		1450	288.6
15		1870	365.7
16		2210	425.3
17		1480	268.8
18	sum	=SUM(C6:C17)	=SUM(D6:D17)
19	mean	=AVERAGE(C6:C17)	=AVERAGE(D6:D17)
20	std	=STDEV.S(C6:C17)	=STDEV.S(D6:D17)
21			
22	r=	=CORREL(C6:C17,D6:D17)	
23	b=	=C22*D20/C20	
24	a=	=D19-C23*C19	

Scatter plot

	x	y
	1360	278.5
	1940	375.7
	1750	339.5
	1550	329.8
	1790	295.6
	1750	310.3
	2230	460.5
	1600	305.2
	1450	288.6
	1870	365.7
	2210	425.3
	1480	268.8
sum	20980	4043.5
mean	1748.333333	336.9583333
std	281.4841618	59.75915994
r=	0.924140029	
b=	0.196195166	
a=	-6.05621486	

Example (conti~)

- Predict the selling price for another residence with 2100 square feet of living area.

- $\hat{y} = a + bx = -6.05 + 0.196x$

   = -6.05 + 0.196(2100) = $405.95(thousand)
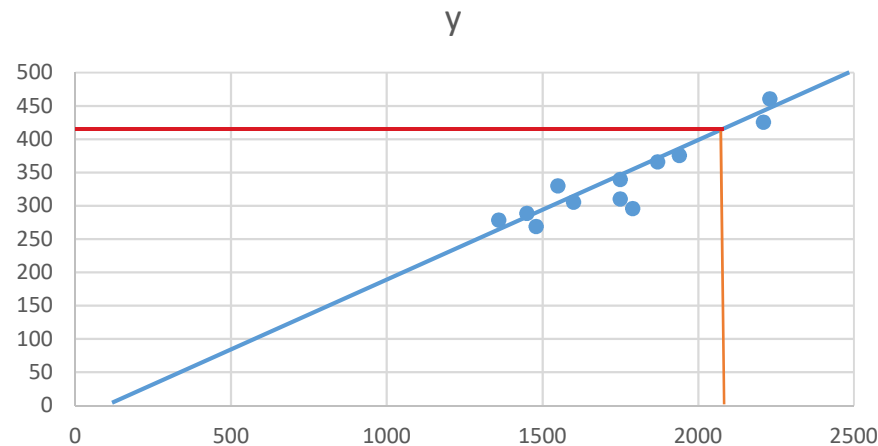
22		r=	=CORREL(C6:C17,D6:D17)	
23		b=	=C22*D20/C20	
24		a=	=D19-C23*C19	
25				
26	x	2100	y=	=$C$24+$C$23*B26
27		2200		=$C$24+$C$23*B27
28		2300		=$C$24+$C$23*B28
29				
30				

22		r=	0.924140029	
23		b=	0.196195166	
24		a=	-6.05621486	
25				
26	x	2100	y=	405.9536333
27		2200		425.5731499
28		2300		445.1926665
29				
30				