

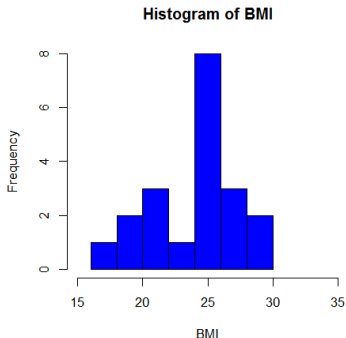
Some Introductory Examples

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BMI in adults - Data collection

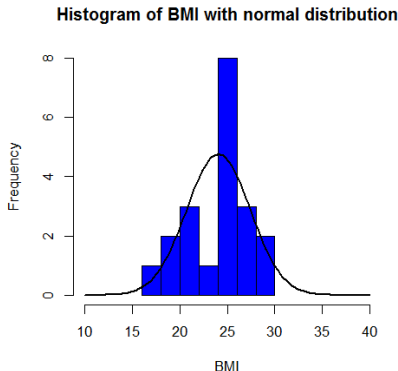
subject	bmi
1	29.3
2	25.3
3	28.6
4	25.3
5	27.8
6	17.7
7	21.4
8	22.9
9	24.3
10	18.9
11	25.7
12	26.8
13	21.4
14	25.4
15	25.1
16	18.2
17	21.2
18	24
19	24.9
20	27.2

BMI in adults - Histogram and descriptive statistics



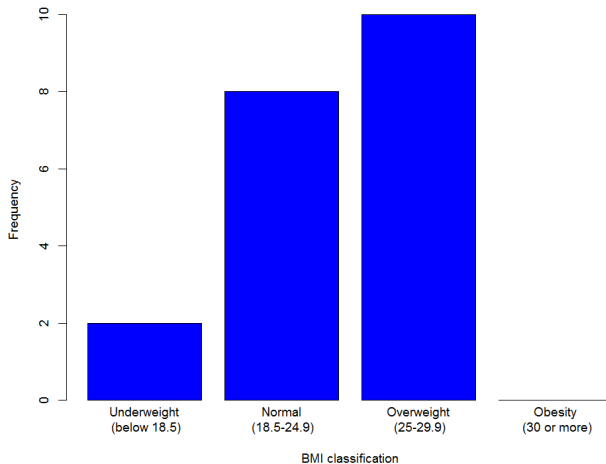
mean=24.1, SD=3.35, median=25.0, min=17.70,
max=29.27

BMI in adults - Histogram and normal distribution

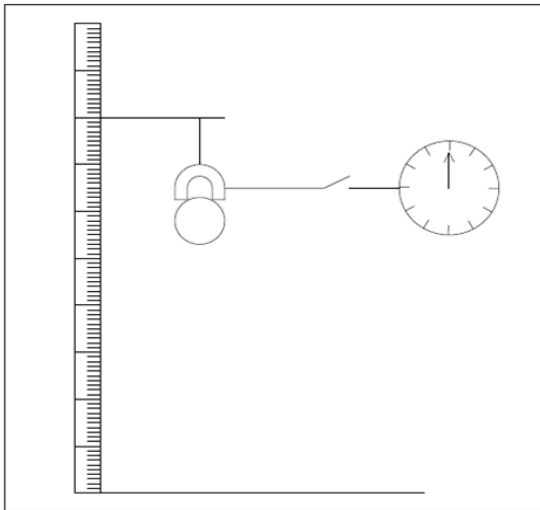


$$P(BMI \geq 30) = 0.03837 = 3.8\%$$

BMI in adults - Barchart



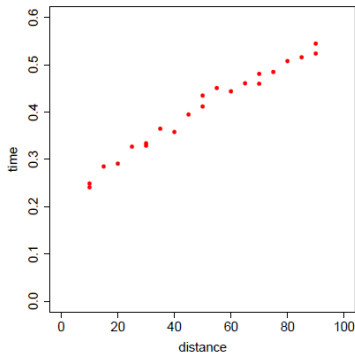
Newton's law - Experiment



Newton's law - Data collection

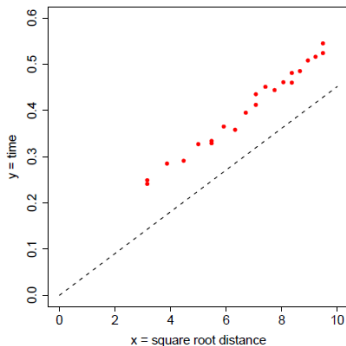
t(sec)	d(cm)	t(sec)	d(cm)	t(sec)	d(cm)
0.241	10	0.358	40	0.460	70
0.249	10	0.395	45	0.485	75
0.285	15	0.435	50	0.508	80
0.291	20	0.412	50	0.516	85
0.327	25	0.451	55	0.524	90
0.329	30	0.444	60	0.545	90
0.334	30	0.461	65		
0.365	35	0.481	70		

Newton's law - Graphical presentation



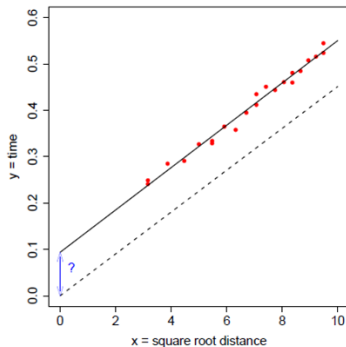
- How would you describe the relationship between distance and time?
- Why do we have time on the y-axis and distance on the x-axis?

Newton's law - Theory versus data



- $d = \frac{1}{2} \cdot g \cdot t^2 \iff t = \sqrt{\frac{2 \cdot d}{g}} = \sqrt{\frac{2}{g}} \cdot \sqrt{d}$
- Why do the data collected not agree with Newton's law?

Example: Newton's law



- How would you interpret the intercept?
- How would you interpret the variation around the straight line?

Newton's law - A statistical model for the experiment

- 1 Use Newton's law as starting point: $d = \frac{1}{2} \cdot g \cdot t^2$
- 2 Let $x = \sqrt{d}$ og $Y = t$ and put Y and the left side of the equation $Y = \beta \cdot x$ ($\beta = \sqrt{\frac{2}{g}}$)
- 3 Add the effects of the experimenter $Y = \alpha + \beta \cdot x + \varepsilon$
- 4 How would you interpret the different elements of the model?

FEV1 in children - first 10 of 654 observations

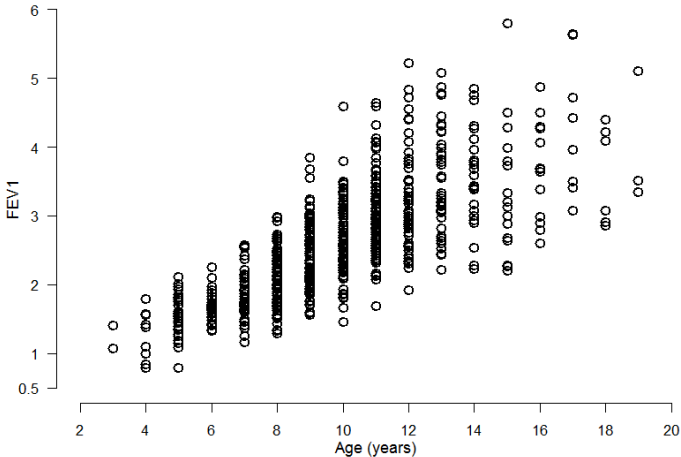
ID	Age	FEV	Height	Sex	Smoker
301	9	1.708	57	Female	Non
451	8	1.724	67.5	Female	Non
501	7	1.72	54.5	Female	Non
642	9	1.558	53	Male	Non
901	9	1.895	57	Male	Non
1701	8	2.336	61	Female	Non
1752	6	1.919	58	Female	Non
1753	6	1.415	56	Female	Non
1901	8	1.987	58.5	Female	Non
1951	9	1.942	60	Female	Non

FEV1 in children - Descriptive statistics by smoking status

	Non-smoker	Smoker
N	589	65
Mean	2.57	3.28
SD	0.85	0.75
Median	2.47	3.17
Min	0.79	1.69
Max	5.79	4.87

- Why do the smokers have higher lung capacity than non-smokers?
- Is it a chance finding?

FEV1 in children - The influence of age



FEV1 in children - The influence of age by smoking status

