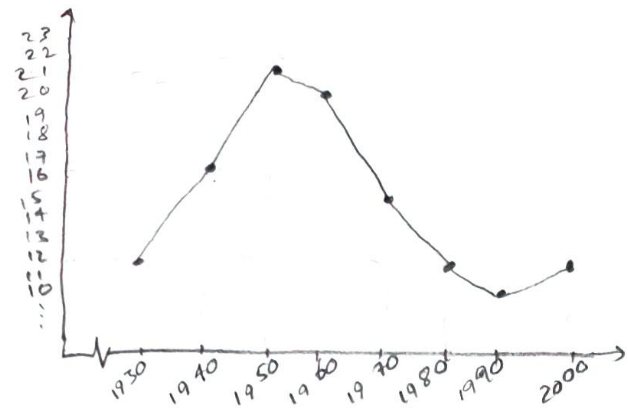
Midterm Homework

Nurettin ACAR - 19010151006

① Time Chart



The number of deaths increased until 1950 then decreased among 1950 to 1990 and again increased until 2000.

②

$$\frac{\text{max data} - \text{min data}}{\text{class}} = \frac{50-33}{6} = \frac{17}{6} = 2.83 \text{ round up } 3 \rightarrow \text{classwidth}$$

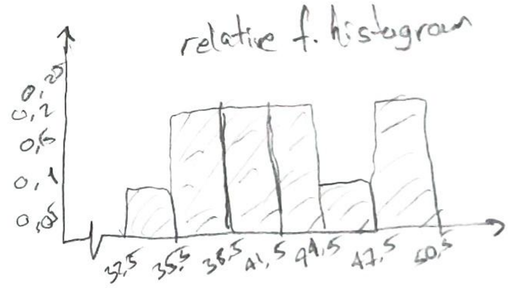
class	f	relative f.	cumulative freq. dist.
33-35	3	0,1	3
36-38	6	0,2	9
39-41	6	0,2	15
42-44	6	0,2	21
45-47	3	0,1	24
48-50	6	0,2	30

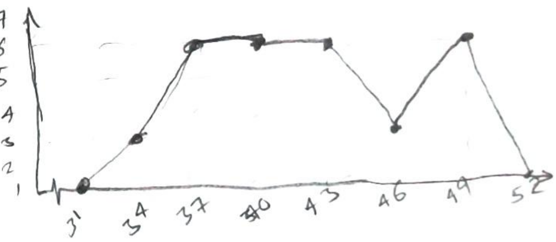
③

class boundraris	f
32,5 - 35,5	3
35,5 - 38,5	6
38,5 - 41,5	6
41,5 - 44,5	6
44,5 - 47,5	3
47,5 - 50,5	6

freq. histogram

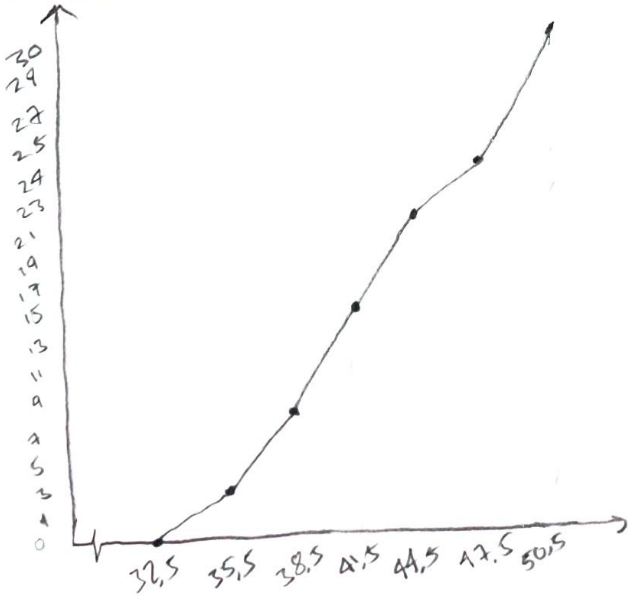
relative f. histogram





freq. Polygon

④



⑤

$\bar{x} = \frac{\Sigma x}{n} = \frac{96+99+92+96+89+97+96+90+91+94}{10} = \boxed{94 = \bar{x}}$ mean

median → 89, 90, 91, 92, 94, $\underbrace{96, 96, \boxed{96}}_{\text{mode}}$, 97, 99 $\quad \frac{97+96}{2} = 95$

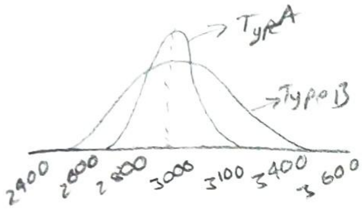
⑥ Range $= 5,2 - 0,8 = \boxed{4,4}$

$\bar{x} = \frac{\Sigma x}{n} = \frac{31,2}{10} = 3,12$ $\quad s^2 = \frac{\Sigma(\bar{x}-x)^2}{n-1} = \frac{4,08+4,33+0,23+3,53+2,82+1,74+0,85+4,33+2,62+5,38}{10-1}$

$= 3,32$

$s = \sqrt{3,32} = 1,8$

⑦



Type A must purchased because the standard deviation is small.

⑧

$Q_1 = 56$

$Q_2 = \frac{70+74}{2} = 72$

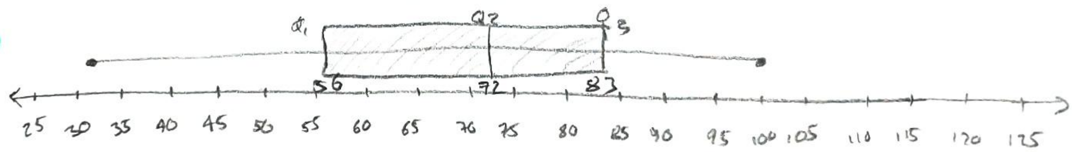
$Q_3 = 83$

$83 - 56 = 27$ IQR

$56\ Q_1 - 1,5.(27) = 15,5$

$83\ Q_3 + 1,5.(27) = 123,5$

a)

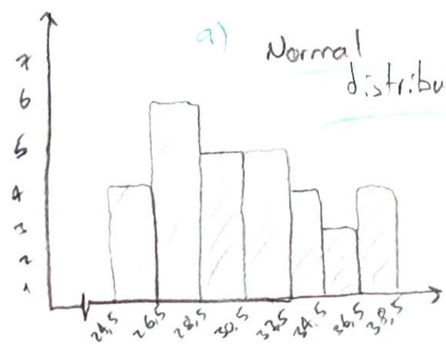


b) The box represent about half of data, which are betwen 56 and 83, The left whisker represent about one quarter of the data, so about 25% of data entries are less than 56, Right whisker greater than 84. Left whisker is much longer than the right one, This is not outlier of the data set

c) There are 22 scores of the data fall on or below the Q_3.

⑨ $\frac{38-25}{7} = 1,85 \approx 2$

Class	f
24,5 - 26,5	4
26,5 - 28,5	6
28,5 - 30,5	5
30,5 - 32,5	5
32,5 - 34,5	4
34,5 - 36,5	3
36,5 - 38,5	4



a) Normal distribution

b) $\mu = \mu_{\bar{x}} = 30$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{4}{\sqrt{30}} = 0,73$

10

$\mu = 160cm$

$\sigma = 7$

$z = \frac{x - \mu}{\sigma}$

$P(150 < x < 200<) = \left(\frac{150-160}{7} < z < \frac{200-160}{7}\right) = (-1{,}4285 z < 5{,}714)$

$P(z < 5{,}714) - P(z < -1{,}428) = 1 - 0{,}922 = \boxed{0{,}078}$

11

$n = 60$

$\bar{x} = 150$

$\sigma = 36$

$\%99 = 2{,}575$

$\%95 = 1{,}96$

a) $E = 2{,}575 \cdot \frac{36}{\sqrt{60}} = 11{,}967$

$\bar{x} - E < \mu < \bar{x} + E$

$150 - 11{,}967 < \mu < 150 + 11{,}967$

$138{,}033 < \mu < 161{,}967$

b) $E = 1{,}96 \cdot \frac{36}{\sqrt{60}} = 9{,}109$

$150 - 9{,}11 < \mu < 150 + 9{,}11$

$140{,}89 < \mu < 159{,}11$

confidence interval is norrowing.

12

$\hat{p} - z\frac{\alpha}{2} \cdot \sqrt{\frac{\hat{p} \cdot (1-\hat{p})}{n}} < p < \hat{p} + z\frac{\alpha}{2} \cdot \sqrt{\frac{\hat{p} \cdot (1-\hat{p})}{n}}$

$n = 300$

$x = 123$

$\hat{p} : \frac{x}{n} = \frac{123}{300} = 0{,}41$

$z = 0{,}02$

$0.41 - 2.33 \sqrt{\frac{(0.41) \cdot (0{,}59)}{300}} < p < 0{,}41 + 2.33 \sqrt{\frac{(0{,}41) \cdot (0{,}59)}{300}}$

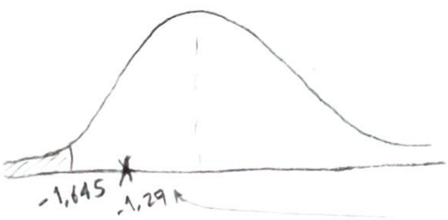
$0{,}343 < p < 0{,}476$

13

$H_0 : \mu \geq 3{,}4$

$H_a : \mu < 3{,}4$ (claim)

$z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}} \Rightarrow \frac{3.3 - 3.4}{\frac{0.6}{\sqrt{60}}} = -\frac{0{,}1}{0{,}07745} = -1.29$



Fail to reject null hypotosis

(14)

$H_0: \mu \leq 60$
$H_a: \mu > 60$ (klaim)

$\bar{x} = \frac{843}{14} = 60{,}21$

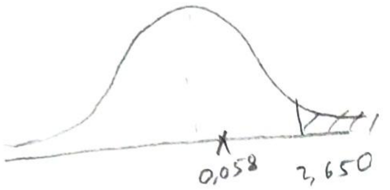
$s = \sqrt{\frac{\Sigma(\bar{x}-x)^2}{n-1}} = \sqrt{\frac{2344{,}356}{13}}$

$= 13{,}43$

$t = \frac{\bar{x}-\mu}{s/\sqrt{n}} \Rightarrow \frac{60{,}21 - 60}{\frac{13{,}43}{\sqrt{14}}} \approx 0{,}058$

$\alpha = 0{,}01$

$t_c = 2650$



Fail to reject null hypotesis

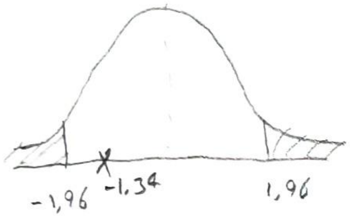
---

(15)

$H_0: P = 0{,}2$
$H_a: P \neq 0{,}2$

$\hat{p} = \frac{x}{n} = \frac{88}{500} = 0{,}176$

$z = \frac{\hat{p} - p}{\sqrt{\frac{(p \cdot q)}{n}}} = \frac{0{,}176 - 0{,}2}{\sqrt{\frac{(0{,}2) \cdot (0{,}8)}{500}}} = \frac{-0{,}024}{0{,}0179} \approx -1{,}34$



Fail to reject hypotesis