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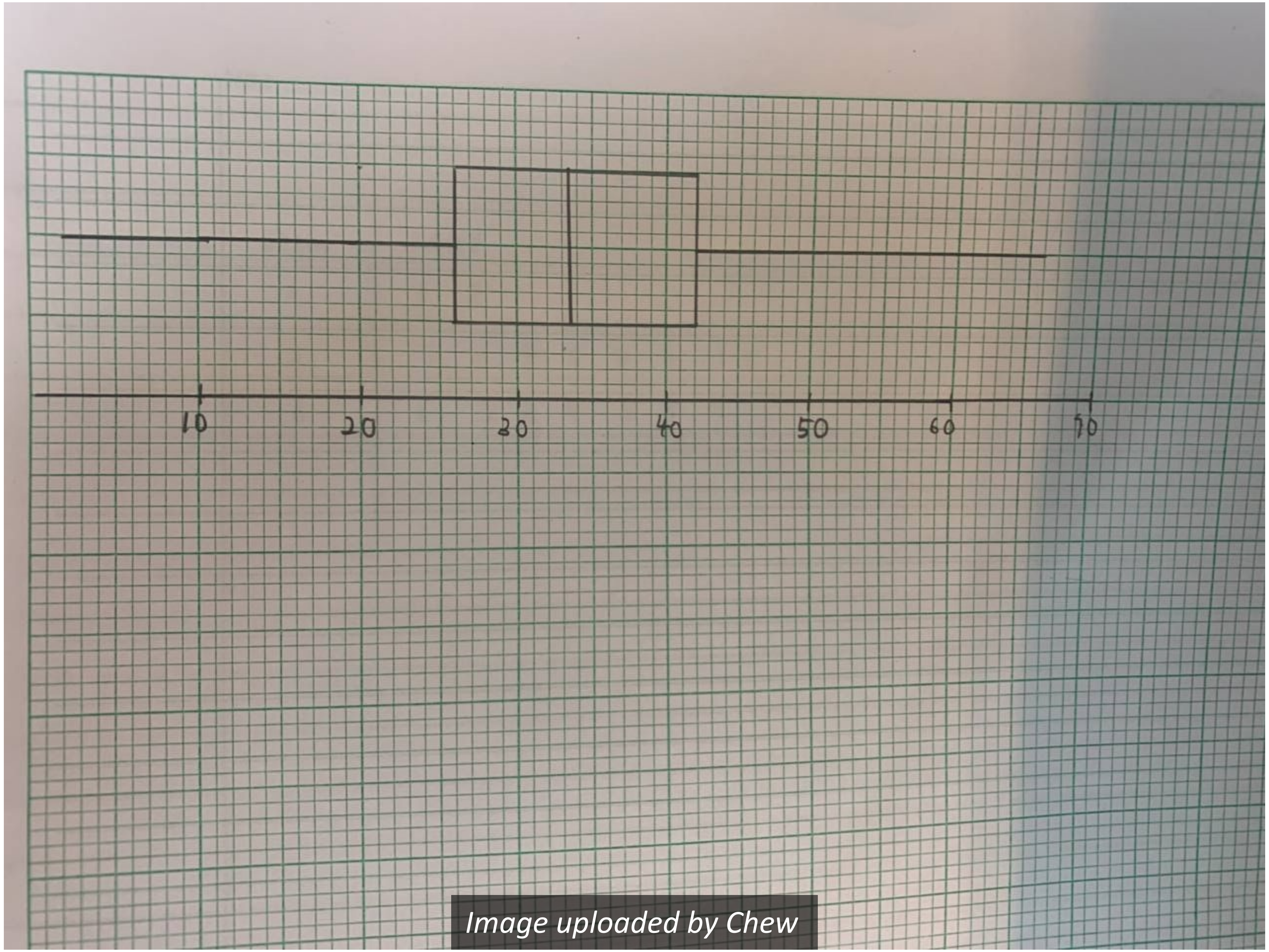
10
20
30
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70

No. Date

(2) $P(A \cup B) = P(A) + P(B)$

$= \frac{1}{5} + \frac{1}{10}$

$= \frac{3}{10}$

$P(A \cap C) = P(A) \times P(C)$

$P(A \cup C) = P(A) + P(C) - P(A)P(C)$

$\frac{7}{15} = \frac{1}{5} + P(C) - \frac{1}{5}P(C)$

$\frac{4}{5}P(C) = \frac{4}{15}$

$P(C) = \frac{1}{3}$

$P(B \cap C) = P(B) \times P(C)$

$P(B \cup C) = P(B) + P(C) - P(B \cap C)$

$\frac{23}{60} = \frac{1}{10} + \frac{1}{3} - P(B \cap C)$

$P(B \cap C) = \frac{1}{20}$

~~Pt~~

$P(B)P(C) = \frac{1}{30}$

Since $\frac{1}{20} \neq \frac{1}{30}$, $P(B \cap C) \neq P(B)P(C)$, events B and C are not independent.

a)

Stem	Leaf
1	8 8
2	0 1 5 5 6 6 9
3	1 2 2 3 4 5
4	0 1 2 3 5 7
5	1 5

key: 5|1 means 51

LF: $26 - 1.5(19) = -2.5$

UF: $45 + 1.5(19) = 73.5$

b) $r = \frac{26}{2} = 13$

median $= \frac{x_{13} + x_{14}}{2}$

$= \frac{33+34}{2}$

$= 33.5$

Q_1: $r = \frac{1}{4} \times 26 = 6.5$

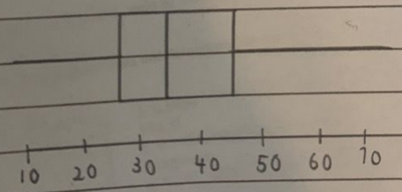
$x[7] = 26$

Q_3: $r = \frac{3}{4} \times 26 = 19.5$

$x[20] = 45$

IQR: $Q_3 - Q_1 = 45 - 26 = 19$

c)



d) $Q_3 - Q_2 = 45 - 33.5 = 11.5$

$Q_2 - Q_1 = 33.5 - 26 = 7.5$

since $Q_2 - Q_1 < Q_3 - Q_2$

the distribution is negatively skewed

Image uploaded by En Qi

No. W24.

Date:

6) H_0: There is no association between English and Mathematics results.

(H_1: There is association between English and mathematics)

O_i	E_i	$\frac{(O_i - E_i)^2}{E_i}$
17	21.105	0.798
28	26.775	0.056
18	15.12	0.549
38	33.165	0.705
45	42.075	0.203
16	23.76	2.534
12	12.73	0.042
12	16.15	1.066
14	9.72	2.611

$X^2 = 8.564$ $\quad v = 4$

$X^2_{5\%}(4) = 9.488$

If $X^2 > 9.488$, Ho is rejected

$X^2 = 8.564 < 9.488$, Ho is not rejected.

There is insufficient evidence at 5% significant level, there is association between Eng and maths

NO.:

Date:

(a)

7. $\int_1^b \sqrt{\frac{u-1}{12}}\,du = 1$

$\left[\frac{(u-1)^{\frac{3}{2}}}{\frac{3}{2}}\right]_1^b = \sqrt{12}$

$\frac{2}{3}[(b-1)]^{\frac{3}{2}} = 2\sqrt{3}$

$b = 4$

(b) $b = 4$

$f(u) = \begin{cases} \sqrt{\frac{u-1}{12}} & , 1 \le u \le 4 \\ 0 \end{cases}$

For $u < 1$

$F(u) = P(X \le u) = \int_{-\infty}^{1} 0\,du$

$= 0$

For $1 \le u < 4$

$F(u) = P(X \le u) = 0 + \int_1^u \sqrt{\frac{u-1}{12}}\,du$

$= \frac{1}{\sqrt{12}} \int_1^u (u-1)^{\frac{1}{2}} du$

$= \frac{1}{\sqrt{12}} \left(\frac{(u-1)^{\frac{3}{2}}}{\frac{3}{2}}\right)_1^u$

$= \frac{1}{3\sqrt{3}} (u-1)^{\frac{3}{2}}$

For $u \ge 4$

$F(u) = P(X \le u) = \int_1^4 \sqrt{\frac{u-1}{12}}\,du + \int_4^u f(u)\,du$

$= \frac{1}{\sqrt{12}} \int_1^4 (u-1)^{\frac{1}{2}} du + 0$

$= \frac{1}{\sqrt{12}} \left[\frac{(u-1)^{\frac{3}{2}}}{\frac{3}{2}}\right]_1^4$

$= \frac{1}{3\sqrt{3}} (4-1)^{\frac{3}{2}}$

$= 1$

$F(u) = \begin{cases} 0 & , u < 1 \\ \frac{1}{3\sqrt{3}} (u-1)^{\frac{3}{2}} & , 1 \le u < 4 \\ 1 & , u \ge 4 \end{cases}$

(c) $E(X) = \int_1^4 u\,P(X = u)$

$= \int_1^4 u \sqrt{\frac{u-1}{12}}\,du$

$u = u - 1 \qquad u = 1, u = 0$

$du = du \qquad u = 4, u = 3$

$= \int_0^3 (u+1) \sqrt{\frac{u}{12}}\,du$

$= \frac{1}{\sqrt{12}} \int_0^3 \left(u^{\frac{3}{2}} + u^{\frac{1}{2}}\right) du$

$= \frac{1}{2\sqrt{3}} \left(\frac{2}{5}u^{\frac{5}{2}} + \frac{2}{3}u^{\frac{3}{2}}\right)_0^3$

$= \frac{14}{5}$

Perkara ....

(8) a) H_0: The height of the students could be modelled by a normal distribution with mean 172 and standard deviation 6

H_1: The height of the student could not be modelled by a normal distribution with mean 172 and standard deviation 6.

Height (cm), x	O_i	$E_i = P\left(\frac{a-172}{6} < Z < \frac{b-172}{6}\right) \times 200$
$x < 149.5$	0	$1 - P(-3.75) \times 200 = 0.018$
$149.5 \leq x < 154.5$	4	$P(-3.75 < Z < -2.917) \times 200 = 0.336$
$154.5 \leq x < 159.5$	6	$P(-2.917 < Z < -2.083) \times 200 = 3.372$
$159.5 \leq x < 164.5$	12	$P(-2.083 < Z < -1.25) \times 200 = 17.404$
$164.5 \leq x < 169.5$	30	$P(-1.25 < Z < -0.417) \times 200 = 46.538$
$169.5 \leq x < 174.5$	64	$P(-0.417 < Z < 0.417) \times 200 = 64.664$
$174.5 \leq x < 179.5$	52	$P(0.417 < Z < 1.25) \times 200 = 46.538$
$179.5 \leq x < 184.5$	18	$P(1.25 < Z < 2.083) \times 200 = 17.404$
$184.5 \leq x < 189.5$	10	$P(2.083 < Z < 2.917) \times 200 = 3.372$
$189.5 \leq x < 194.5$	4	$P(2.917 < Z < 3.75) \times 200 = 0.336$
$x \geq 194.5$	0	$P(3.75) \times 200 = 0.018$

x	O_i	E_i	$\frac{(O_i - E_i)^2}{E_i}$
$x < 149.5$, $149.5 \leq x < 164.5$	22	21.130	0.0342
$164.5 \leq x < 169.5$	30	46.538	5.8770
$169.5 \leq x < 174.5$	64	64.664	0.0068
$174.5 \leq x < 179.5$	52	46.538	0.6411
$x \geq 179.5$	32	21.130	5.5919

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

$$= 12.151$$

Image uploaded by Emily

Test at 5% significance level,
degree of freedom, $v = 5-1$
$= 4$

$\chi^2_{5\%}(4) = 9.488$
Reject H_0 if $\chi^2 > 9.488$

$\therefore$ Since $\chi^2 = 12.151 > 9.488$, H_0 is rejected,
There is sufficient evidence at 5% significance level that the height of the students could not be modelled by a normal distribution with mean 172 and standard deviation 6.

b) If the mean and the standard deviation were unknown, need to estimate the mean and variance.
The estimated mean is 173.15 while the estimated variance is 58.22.
The degree of freedom is calculated by using 5 categories subtract 3 retrictions. $(V = 5-3 = 2)$

4) $\hat{\mu} = \frac{15310}{100}$

$= 153.1$

$\hat{\sigma}^2 = \frac{n}{n-1} s^2$

$= \frac{100}{100-1} \left[\frac{2370300}{100} - \left(\frac{15310}{100} \right)^2 \right]$

$= 266.051$

95% confidence interval for μ $= \left[\bar{x} \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{\sigma^2}{n}} \right]$

$= \left[153.1 \pm Z_{\frac{0.05}{2}} \sqrt{\frac{266.051}{100}} \right]$

$= \left[153.1 \pm 1.96 \sqrt{\frac{266.051}{100}} \right]$

$= (149.9 , 156.3)$

$\therefore$ the 95% confidence interval for μ is between $149.9 < \mu < 156.3$

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3. $n = 5000$, $p = 0.001$

$X \sim N(5, 4.995)$

$P(X > 2) = P(X > 2.5)$

$= P\left(Z > \frac{2.5 - 5}{\sqrt{4.995}}\right)$

$= 0.8884$

4. $\hat{\mu} = \bar{x}$

$= \frac{\Sigma x}{n}$

$= \frac{15310}{100}$

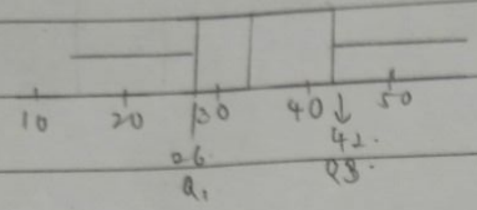
$\hat{\sigma}^2 = \frac{n}{n-1} s^2$

$= \frac{100}{99}\left[\frac{2370300}{100} - (153.1)^2\right]$

$= 266.05$

33·5

(c) min = 18 max = 55 Median = 13 Q_1 = 26 Q_3 = 42



(d) Skewed to the right because

$Q_3 - M > M - Q_1$

2) $P(A \cup B) = P(A) + P(B)$

$= \frac{3}{10}$

$P(A \cap C)$

$\frac{7}{15} = \frac{1}{5} + P(C) - P(A \cap C)$

$P(C) - P(A \cap C) = \frac{4}{15}$

$(P(A) \times P(C) = \frac{1}{5} + P(C) - P(A \cup C).)$

$\frac{1}{5}(P(C) = \frac{1}{5} + P(C) - \frac{7}{15}$

$\frac{1}{5}P(C) = P(C) - \frac{4}{15}$

$\frac{1}{5}P(C) - P(C) = -\frac{4}{15}$

$-\frac{4}{5}P(C) = -\frac{4}{15}$

$P(C) = \frac{1}{3}$.

$P(B \cap C)$

$\frac{23}{60} = \frac{1}{10} + P(C) - P(B \cap C)$

$\frac{23}{60} = \frac{1}{10} + (\frac{1}{3}) - P(B \cap C)$

$-P(B \cap C) + \frac{13}{30} = \frac{23}{60}$

$-P(B \cap C) = -\frac{1}{20}$

$P(B \cap C) = \frac{1}{20}$.

B and C are independent.

) Population proportion of defective bulbs: mean = 0.001 (5000)

= 5

X ~ N (5, 4.995) by CLT

$= \left[153.10 \pm 1.960 \sqrt{\frac{266.05}{100}} \right]$

$= (149.9 \,,\, 156.3)$ #

5 population : X represents the amount of juice $X \sim N(60, 3^2)$

sample : $n = 16$

μ represents mean amount of juice per carton

$H_0 : \mu = 60$

$H_1 : \mu < 60$

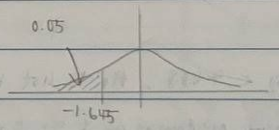
If H_0 is true, then $\bar{X} \sim N\left(60, \frac{3^2}{16}\right)$

(lower tailed test)

$\alpha = 0.05$

critical value $= -z_{0.05}$

$= -1.645$



reject H_0 if $z < -1.645$

$$z = \frac{59.1 - 60}{\sqrt{\frac{3^2}{16}}}$$

$= -1.2$

Since $z = -1.2 > -1.645$, H_0 is not rejected.

There is insufficient evidence at 5% significance level to uphold the complaints