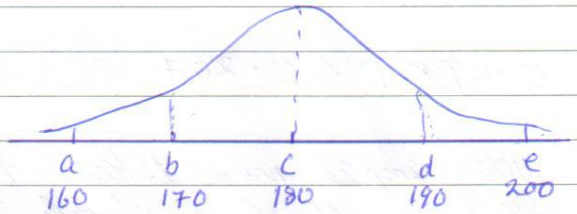
Test Questions

Q3 $\mu = 180$ $\sigma = 10$

(i)



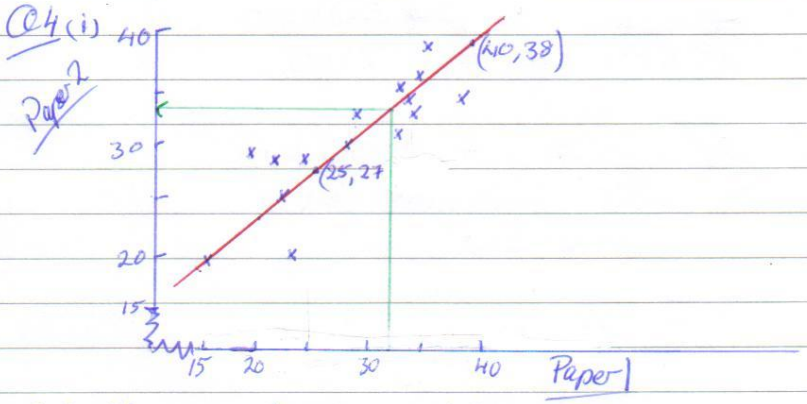
(ii) $z = \frac{190 - 180}{10} = 1$

(iii) > 190 RHS of 180 $\Rightarrow$ 190 $= \frac{1}{2}(68\%) = 34\%$

$50\% - 34\% = 16\%$

$\Rightarrow 16\% > 190\text{cm}$.

Q4 (i)



(ii) Strong positive correlation

(iii) (25, 27) (40, 38) $m = \frac{38 - 27}{40 - 25} = \frac{11}{15}$

$y - 27 = \frac{11}{15}(x - 25)$

$15y - 405 = 11x - 275$

$15y = 11x + 130$

$y = 0.73x + 8.67$

(iv) approx 34.

Q5 $\mu = 175$. 95% $\Rightarrow \mu \pm 2\sigma$

$190 - 175 = 15$ $\quad$ $175 - 160 = 15$

$\Rightarrow 15 = 2\sigma$ $\quad$ $\Rightarrow \sigma = 7.5$

Q8 (i) Shaded area = 95% of Population.

$\Rightarrow P(\text{Shaded}) = 95\%$

(ii) Shaded area $= \frac{1}{2}(95\%) = 47.5\%$

$\Rightarrow P(\text{Shaded}) = 47.5\%$

Q9 (i) French $\quad z = \frac{76-68}{10} = 0.8$

(ii) German $\quad z = \frac{78-70}{12} = 0.66$

(iii) He did better in French.

(B) Questions

Q1 $\hat{p} = \frac{527}{2000} = 0.26$

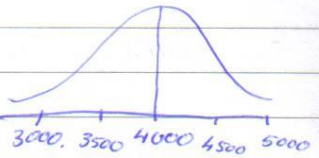
(i) $E = \frac{1}{\sqrt{2000}} = 0.022$

(ii) $0.26 - 0.022 < p < 0.26 + 0.022$

$0.241 < p < 0.286.$

Q2 $\mu = 4000 \quad \sigma = 500$

(i) $z = \frac{3000 - 4000}{500} = -2.$



$\Rightarrow$ 3000 is 2 Standard deviations below the mean

$\frac{1}{2}(95\%) = 47.5\%$ to LHS of mean

$\therefore 50\% - 47.5\% = 2.5\%$ less than 3000 hrs

(ii) Between 3000 and 5000 $= 95\%$

$\Rightarrow P(3000 < x < 5000) = 95\%$ or 0.95

(iii) $2\frac{1}{2}\%$ of Tubes will work after 5000 hrs

$2\frac{1}{2}\%$ of $10,000 = 250$ bulbs.

Q3 (i) $r = 0.959$ calculator

(ii) A strong positive correlation between N° of employees and units produced.

Q4 (i) $E = \frac{1}{\sqrt{1111}} = 0.03$

(ii) $\hat{p} = \frac{234}{1111} = 0.21$

$0.21 - 0.03 < p < 0.21 + 0.03$

$0.18 < p < 0.24$

$18\% < p < 24\%$

23% is within the interval hence their claim cannot be rejected.

Q7

(i) $E = \frac{1}{\sqrt{400}} = 0.05$

(ii) $\hat{p} = \frac{64}{400} = 0.16$

$0.11 < p < 0.21$

$11\% < p < 21\%$

20% lies within this interval, hence Co's claim can be accepted.

C Questions

Q1 $\mu = 20 \quad \sigma = 3$.

(i) $17 = \mu - \sigma$ and $23 = \mu + \sigma$

$\Rightarrow$ 68% are between 17 and 23

$14 = \mu - 2\sigma$ and $23 = \mu + \sigma$

$\frac{1}{2}(95\%) = 47.5\%$ $\quad$ $\frac{1}{2}(68\%) = 34\%$

$\Rightarrow 47.5 + 34 = 81.5\%$ are between 14 & 23

(ii) between 17 and 26.

$\mu - \sigma$ (34%) $\quad$ $\mu + 2\sigma$ (47.5%)

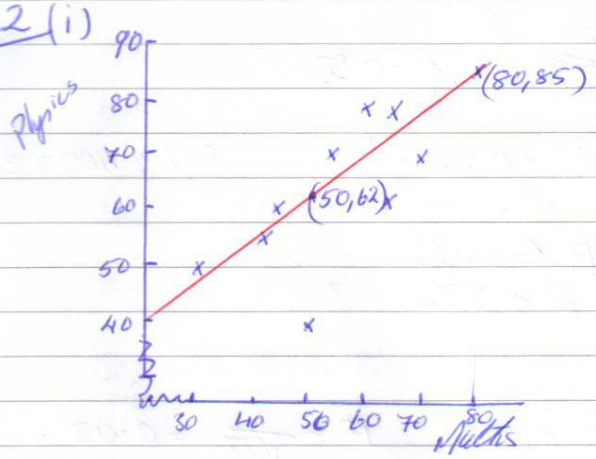
81.5% of 10000 = 8150 nails

(iii) $23 = \mu + \sigma$

= 34% on RHS

50 - 34 = 16% are more than 23

Q2 (i)



(ii)

$(80, 85)$ $(50, 62)$

$m = \frac{62-85}{50-80} = 0.77$

$y - 85 = 0.77(x - 80)$

$y - 85 = 0.77x - 61.3$

$y = 0.77x + 18.6$

(iii) $r = 0.737$

(iv) There is a strong pos corr, meaning a student who achieves a high mark in Maths is likely to achieve a high mark in physics.

Q3

(i) $E = \frac{1}{\sqrt{400}} = 0.05$

(ii) $\hat{p} = \frac{352}{400} = 0.88$ 88% of 400 = 352

$0.83 < p < 0.93$

$83\% < p < 93\%$

Dublin

$\hat{p} = \frac{810}{1000} = 0.81$ $E = \frac{1}{\sqrt{1000}} = 0.03$

$0.78 < p < 0.84$

88% does not lie in this interval

∴ Co's claim is not justified

Q4 $\mu = 60 \quad \sigma = 8$

(i) Abdul $z = \frac{70-60}{8} = 1.25$

Marie $z = \frac{52-60}{8} = -1$

George $z = \frac{60-60}{8} = 0$

Elsie $z = \frac{92-60}{8} = 4$

(ii) 76 yrs $= \mu + 2\sigma$ (95%)

more than 76 yrs $\frac{1}{2}(95) = 47\frac{1}{2}\%$

$50 - 47\frac{1}{2} = 2.5\%$

(iii) $2.5 = \frac{x-60}{8}$

$8(2.5) + 60 = x$

$80 \text{ yrs} = x$

(iv)

$z = \frac{40-60}{8} = -2.5$

$\Rightarrow$ Very Unlikely Less than 1%

Q5 (i) $r = -0.8$ approx

(ii) Outlier age = 37 bpm = 139

(iii) approx 180 bpm.

(iv) $(20, 200)$ $(80, 150)$

$$m = \frac{150-200}{80-20} = -0.833$$

$$m = -0.8$$

(v) $y - 200 = -0.833(x - 20)$

$y - 200 = -0.833x + 16.66$

$y = -0.8x + 216.$

$MHR = 216 - 0.8(age)$

(vi) $MHR = 220 - age.$

age	old Rule	new Rule
20	200	200
50	170	176
70	150	160

for a young person the MHR's are roughly the same for older people the new rule gives a higher MHR

(vii) old rule : MHR = 155 new Rule : MHR = 164

To get more benefit he should increase his activity to 75% of 164 instead of 75% of 155.