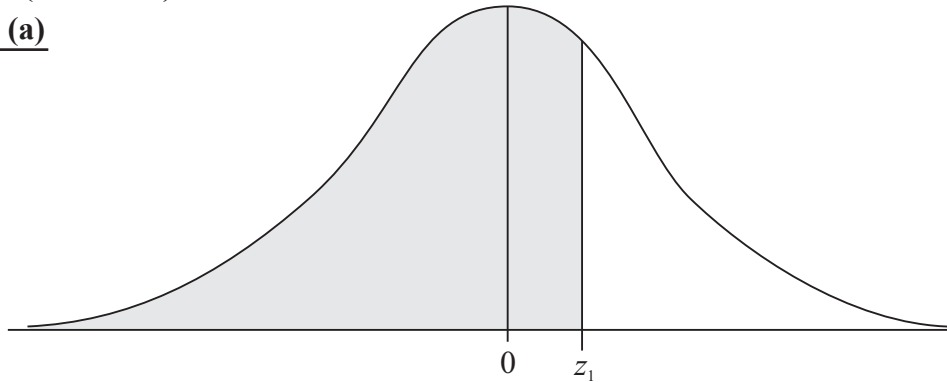


LC 2018: PAPER 2

QUESTION 2 (25 MARKS)

Question 2 (a)



$$P(z \leq z_1) = 0.67 \Rightarrow z_1 = 0.44$$

Question 2 (b)

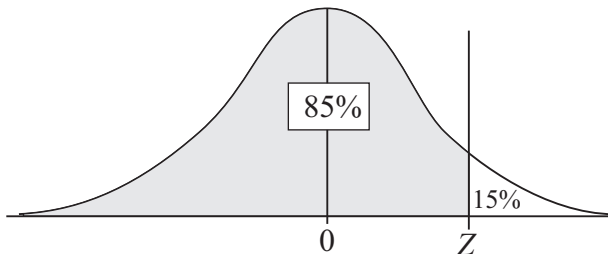
- (i) Maths exam: $\mu = 70, \sigma = 15, x = 65$
 English exam: $\mu = 72, \sigma = 10, x = 68$

$$\text{Maths: } z_1 = \frac{x - \mu}{\sigma} = \frac{65 - 70}{15} = -\frac{1}{3} = -0.33$$

$$\text{English: } z_2 = \frac{x - \mu}{\sigma} = \frac{68 - 72}{10} = -\frac{2}{5} = -0.4$$

Mary did better relatively in Maths.
 In Maths she is 0.33 standard deviations from the mean whereas in English she is 0.4 standard deviations from the mean.

(ii)

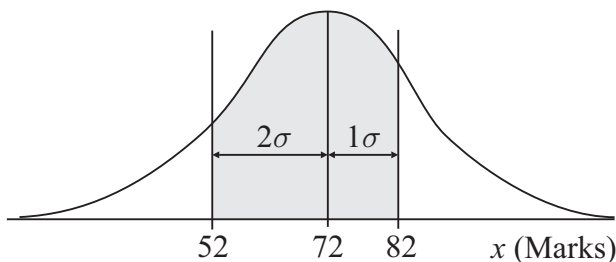


$$P(Z \leq z) = 0.85 \Rightarrow Z = 1.04$$

$$1.04 = \frac{X - 72}{10} \Rightarrow X = 82.4$$

Answer: 83 marks

(iii)



$$P(52 \leq x \leq 82) = \frac{68}{2} + \frac{95}{2} = 81.5\%$$

MARKING SCHEME NOTES

Question 2 (a) [Scale 10D (0, 2, 5)]

- 2: • $P(z < z_1) = 0.67$

Question 2 (b) (i) [Scale 10C (0, 3, 7, 10)]

- 3: • Relevant formula with some correct substitution

• $\frac{65 - 70}{15}$ or $\frac{68 - 72}{10}$

- 7: • $\frac{65 - 70}{15}$ and $\frac{68 - 72}{10}$

Question 2 (b) (ii) [Scale 5C (0, 2, 4, 5)]

- 2: • 0.15

• 1.04

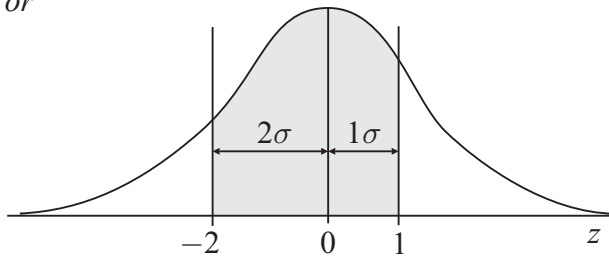
- Relevant formula with some correct substitution

- 4: • Relevant equation in x

The **empirical rule** states that in a normal distribution with mean μ and standard deviation σ :

1. 68% of the data falls within 1σ of the mean μ .
2. 95% of the data falls within 2σ of the mean μ .
3. 99.7% of the data falls within 3σ of the mean μ .

or



$$\begin{aligned}
 P(-2 < z < 1) &= P(z < 1) - P(z < -2) \\
 &= P(z < 1) - P(z > 2) \\
 &= P(z < 1) - [1 - P(z < 2)] \\
 &= P(z < 1) + P(z < 2) - 1 \\
 &= 0.8413 + 0.9772 - 1 = 0.8185 = 81.85\%
 \end{aligned}$$

MARKING SCHEME NOTES

Question 2 (b) (iii) [Scale 5C (0, 2, 4, 5)]

2: • Evidence of relevant linking of deviation and mean

• $\frac{68}{2}$ or $\frac{95}{2}$

• $\frac{52-72}{10}$ or $\frac{82-72}{10}$

• $\frac{0.6826}{2}$ or $\frac{0.9544}{2}$

4: • $\frac{68}{2}$ and $\frac{95}{2}$

• $\frac{52-72}{10}$ and $\frac{82-72}{10}$

• $\frac{0.6826}{2}$ and $\frac{0.9544}{2}$