

# EDEXCEL FOUNDATION - LONDON EXAMINATIONS

Stewart House 32 Russell Square London WC1B 5DN

June 2001

Advanced Supplementary/Advanced Level

General Certificate of Education

Subject STATISTICS 6683

Paper No. S1

Question number	Scheme	Marks
1.	<p>(a) <math>\mu = \frac{1075}{25} = 43</math></p> <p><math>\sigma^2 = \frac{46625}{25} - (43)^2 = 16</math></p> <p><math>\therefore \sigma = 4</math></p> <p>(b) One value is 8 below <math>\mu</math> and the other is 8 above <math>\mu</math></p> <p><math>\therefore</math> Mean is unchanged</p> <p><i>Handwritten notes:</i>  <math>\sigma_{n-1}</math> = ANSWER 4.08 B1                  Do not ignore subsequent marking</p>	<p>cao B1</p> <p>M1</p> <p>cao A1 (3)</p> <p>B1</p> <p>B1 (2)</p>
2.	<p>(a) <math>S_{xx} = 6599600 - \frac{(7300)^2}{10}</math></p> <p><math>= 1270600</math></p> <p>(b) <math>r = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}} = \frac{-13060}{\sqrt{1270600 \times 140.9}}</math></p> <p><math>= -0.976075 \dots</math></p> <p>(c) As height increases temperature decreases (Must be IN CONTEXT)</p>	<p>M1</p> <p>cao A1 (2)</p> <p>Correct substit<sup>n</sup> of their values M1</p> <p>-0.976 A1 (2)</p> <p>B1 (1)</p>

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3.	<p>(a) <math>P(Y &lt; 80) = P\left(Z &lt; \frac{80 - 100}{\sqrt{256}}\right)</math></p> <p style="margin-left: 100px;"><math>= P(Z &lt; -1.25)</math></p> <p style="margin-left: 100px;"><math>= 1 - \Phi(1.25) = \underline{0.1056}</math></p> <p>(b) <math>P(100 - k \leq Y \leq 100 + k) = 0.516</math></p> <p style="margin-left: 100px;"><math>\therefore P(Y \leq 100 + k) = 0.516 + \frac{1}{2}(1 - 0.516)</math></p> <p style="margin-left: 100px;"><math>= \underline{0.758}</math></p> <p style="margin-left: 100px;"><math>\therefore P(Z \leq \frac{k}{16}) = 0.758</math></p> <p style="margin-left: 100px;"><math>\therefore \frac{k}{16} = 0.7 \Rightarrow \underline{k = 11.2}</math></p>	<p>Standardising M1</p> <p>Allow <math>\sqrt{256}</math> or <math>256</math> A1</p> <p><math>\pm 1.25</math> A1</p> <p>ISW A1 (3)</p> <p>0.758 B1</p> <p><math>\pm k/16</math> B1</p> <p><math>k/16 = \Phi^{-1}(0.758)</math> M1</p> <p><math>= 0.7</math> B1 (3)</p> <p><math>k = 11.2</math> A1</p>
4.	<p>(a) <math>\alpha = \underline{0.2}</math></p> <p>(b) <math>P(-1 &lt; X \leq 2) = P(0) + P(1) + P(2)</math></p> <p style="margin-left: 100px;"><math>= \underline{0.6}</math></p> <p>(c) <math>F(-0.4) = \underline{0.3}</math></p> <p>(d) <math>E(X) = (-2 \times 0.1) + \dots + (3 \times 0.1)</math></p> <p style="margin-left: 100px;"><math>= \underline{0.3}</math></p> <p style="margin-left: 100px;"><math>\therefore E(3X + 4) = (3 \times 0.3) + 4</math></p> <p style="margin-left: 100px;"><math>= \underline{4.9}</math></p> <p>(e) <math>\text{Var}(X) = (-2^2 \times 0.1) + \dots + (3^2 \times 0.1) - (0.3)^2</math></p> <p style="margin-left: 100px;"><math>= \underline{2.01}</math></p> <p style="margin-left: 100px;"><math>\text{Var}(2X + 3) = 4 \text{Var}(X) = 4 \times 2.01</math></p> <p style="margin-left: 100px;"><math>= \underline{8.04}</math></p>	<p>cao B1 (1)</p> <p>M1 A1 (2)</p> <p><math>\alpha &lt; 1.0</math> B1 (1)</p> <p>Attempt at <math>\sum x^2 P(X=x)</math> M1</p> <p>A1</p> <p>Use of <math>E(ax+b)</math> M1</p> <p>A1 (4)</p> <p>Attempt at <math>\sum x^2 P(X=x) - \mu^2</math> M1</p> <p>A1</p> <p>Use of <math>\text{Var}(ax+b)</math> M1</p> <p>A1 (4)</p>

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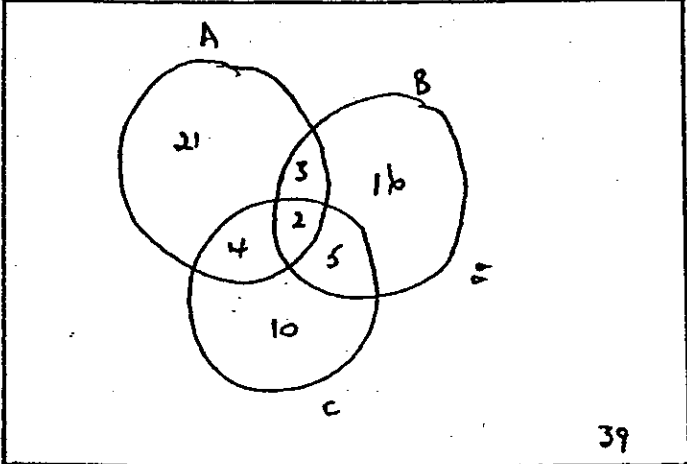
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5.	<p>(a)</p>  <p>(b) <math>P(\text{at least one}) = \frac{21+3+\dots+10}{100}</math> or <math>1 - \frac{39}{100}</math>  <math>= \frac{61}{100} = 0.61</math></p> <p>(c) <math>P(\text{only A}) = \frac{21}{100} = 0.21</math></p> <p>(d) <math>P(\text{only one}) = \frac{21+16+10}{100}</math>  <math>= \frac{47}{100} = 0.47</math></p> <p>(e) <math>P(A \text{only reads one}) = \frac{0.21}{0.47}</math>  <math>= \frac{21}{47} = 0.4468\dots</math></p>	<p>2 B1            4, 3, 5 M1A1            21, 16, 10 M1A1            39 B1 (6)</p> <p>M1            A1✓ (2)            B1✓ (1)            M1            A1✓ (2)            M1            Use of <math>\frac{1(A \cap B)}{P(B)}</math> etc            ie:- Their (c) / Their (d)            AWR7 0.445 A1✓ (2)</p>

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6.	<p>(a) <math>Q_1 = 30; Q_2 = \frac{1}{2}(41+43) = 42; Q_3 = 46</math></p> <p>(b)</p> <p>NB No graph paper =&gt; %</p> <p>Scales &amp; Labels</p> <p>Bar plot</p> <p>Alan - 30, 42, 46 29, 50</p> <p>Diane - 37, 42, 53 35, 65</p> <p>Gopal - 34, 42, 50 25, 57</p> <p>Alan</p> <p>Diane</p> <p>Gopal</p> <p>20 30 40 50 60 70</p> <p>LENGTH</p>	<p>B1; M1A1; B1 (4)</p> <p>B1</p> <p>M1</p> <p>A1 ✓</p> <p>A1 (4)</p> <p>B1</p> <p>R1 (2)</p> <p>B1</p> <p>R1 (2)</p>
	<p>(c)</p> <p>Alan Diane Gopal</p> <p>-ve skew    +ve skew    symmetrical</p> <p>all same median</p> <p>all same IQR</p> <p>Any other comment eg - Diane tends to have more lengths than the other two</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1 (4)</p>

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7.	<p>(a) </p> <p>Scales &amp; Labels B1 Points B2 (9.8 points B1) <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">3</span></p> <p>18 No graph paper <math>\Rightarrow 0/5</math></p> <p>(b) <math>\sum x = 76, \sum y = 120</math> Can be implied B1 B1 (2)</p> $b = \frac{10 \times 749 - 76 \times 120}{10 \times 76 - (76)^2} = \frac{-1630}{1684} = -0.96793\dots$ <p>Use of <math>S_{xy}/S_{xx}</math> a.e.f. M1 Correct subs? A1 AWRT -0.97 A1 (3)</p> $a = \frac{120}{10} - (-0.96793\dots) \left( \frac{76}{10} \right)$ $= 19.356\dots$ <p>Use of <math>\bar{y} - b\bar{x}</math> M1 Correct subs without prem. approx A1 (3) AWRT 19.4 B1 (1)</p> <p><math>\therefore y = 19.4 - 0.968x</math> or <math>19.4 - 0.97x</math></p> <p>(c) <math>b \Rightarrow</math> for every extra hour of practice 1 (-0.968) less errors will be made B1 <math>a \Rightarrow</math> without practice 19/20 errors will be made. B1 (2)</p> <p>(d)(i) Yes - all points reasonably close to the line B1 (ii) No - more likely to be  B1 (2)</p>	