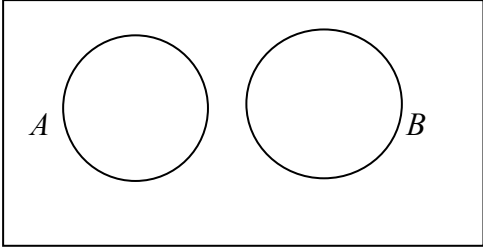
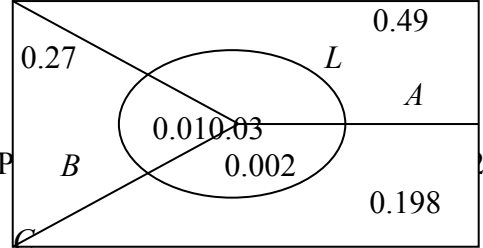
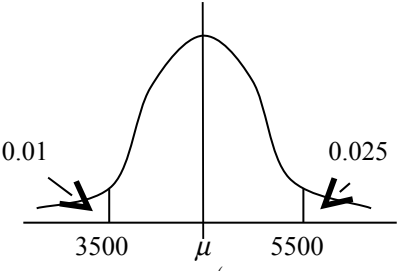


EDEXCEL STATISTICS S1 (6683) - JUNE 2002  
 PROVISIONAL MARK SCHEME

Question Number	Scheme	Marks
1.	$P(\text{Not } 6) = 1 - \frac{1}{6} = \frac{5}{6}$ $P(6 \text{ on third throw}) = \frac{5}{6} \times \frac{5}{6} \times \frac{1}{6} = 0.116$ $= \frac{25}{216} = 0.1157\dots \text{ (accept } 0.116)$	B1 (1) M1 A1ft A1 (3) <b>(4 marks)</b>
2.	Observe real world problem Devise a statistical model and collect data Compare observed against expected outcomes and test the model Refine model if necessary	B1 B1 B1 B1 (4) <b>(4 marks)</b>
3.	<p>(a) <math>P(B A)</math> = Probability of <math>B</math>, given <math>A</math> has occurred</p> <p>(b)</p>  <p>(c) <math>P(\text{Amber is late}) = 0.5 \times 0.02 = 0.01</math></p> <p>(d)</p>  <p>(e)</p>	B1, B1 (2) A & B no overlap B1 (2) M1 A1 cao (2) complete diagram M1 0.49; 0.01 B1 0.198; 0.002 B1 0.27; 0.03 B1 (4) intersections, three of them added M1 A1 cao (2) <b>(12 marks)</b>

ft = follow-through mark; cao = correct answer only

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 PROVISIONAL MARK SCHEME

Question Number	Scheme	Marks																		
<p>4. (a)</p> <table border="1" style="margin-left: 20px;"> <tr> <td style="padding: 5px;"><math>x</math></td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">8</td> </tr> <tr> <td style="padding: 5px;"><math>P(X=x)</math></td> <td style="padding: 5px;">0.1</td> <td style="padding: 5px;">0.1</td> <td style="padding: 5px;">0.05</td> <td style="padding: 5px;">0.15</td> <td style="padding: 5px;">0.1</td> <td style="padding: 5px;">0.1</td> <td style="padding: 5px;">0.15</td> <td style="padding: 5px;">0.25</td> </tr> </table> <p>(b)</p> $E(X) = (1 \times 0.1) + (2 \times 0.1) + \dots + (8 \times 0.25)$ $= 5.2$ $E(X^2) = (1^2 \times 0.1) + (2^2 \times 0.1) + \dots + (8^2 \times 0.25)$ $= 32.8$ $\text{Var}(X) = E(X^2) - \{E(X)\}^2$ $= 32.8 - (5.2)^2 = 5.76 (*)$ <p>(c)</p> $E(Y) = 2E(X) + 3 = 13.4$ $\text{Var}(Y) = 2^2 \text{Var}(X)$ $= 4 \times 5.76 = 23.04$	$x$	1	2	3	4	5	6	7	8	$P(X=x)$	0.1	0.1	0.05	0.15	0.1	0.1	0.15	0.25		<p>M1                  A2 (-1 eeo) (3)</p> <p>M1                  A1                  M1                  A1                  M1                  A1 cso (6)</p> <p>B1                  M1                  A1 (3)                  (12 marks)</p>
$x$	1	2	3	4	5	6	7	8												
$P(X=x)$	0.1	0.1	0.05	0.15	0.1	0.1	0.15	0.25												
<p>5. (a)</p> <p>Bell shaped curve; symmetrical about the mean; 95% of data lies within 2sd of mean; asymptotic etc (any 2).</p> <p>(b)</p>  <p style="margin-left: 20px;"> <math>P(X &lt; 3500) = 0.01 \Rightarrow \mu - 3500 = 2.3263\sigma</math>  <math>P(X &lt; 5500) = 0.025 \Rightarrow 5500 - \mu = 1.96\sigma</math>                      solving for <math>\mu</math> and <math>\sigma</math>  <math>\sigma = 466.6028\dots</math> accept 466.6/467  <math>\mu = 4585.4583\dots</math> accept 4585.5/4590                 </p> <p>(c)</p> $P(X < 4000) = P\left(Z < \frac{4000 - 4585.4583\dots}{466.6028\dots}\right)$ $= P(Z < -1.25)$ $= 0.1056$		<p>B1; B1 (2)</p> <p>M1 A1                  A1                  M1                  A1                  A1 (6)</p> <p>M1 A1ft                  A1                  A1 (4)                  (12 marks)</p>																		

(\*) indicates final answer is given on question paper; ft = follow-through mark

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 PROVISIONAL MARK SCHEME

Question Number	Scheme	Marks
6.	(a) Frequency densities – 5, 0, 10, 4, 110, 75, 1.7	B1
	Graph: scales and labels, shape, correct frequency densities	B1, M1, A1
		<b>(4)</b>
	(b) $\Sigma fy = 2888.5$ Mean weight = $14 + \frac{2888.5}{50 \times 10}$ $= 19.777$	B1 M1 A1
	$S_y = \sqrt{\frac{171503.75}{50} - \left(\frac{2888.5}{50}\right)^2}$ $= 9.62819\dots$	accept 19.78/19.8 A1 M1 awrt 9.63 A1
Standard deviation of weight = $\frac{9.62819}{10} = 0.96219\dots$ (NB: Using $n - 1$ gives 0.9725...)	accept 0.963/0.96 A1ft <b>(6)</b>	
(c) $Q_2 = 20.0 + \frac{(25 - 12)}{22} \times 0.2$ $= 20.118\dots$	M1 accept 20.1/20.12 A1	
(d) Median – data skewed Mean – lower value; fewer complaints	B1 B1 <b>(2)</b> <b>(14 marks)</b>	

awrt = anything which rounds to

EDEXCEL STATISTICS S1 (6683) - JUNE 2002  
 PROVISIONAL MARK SCHEME

Question Number	Scheme	Marks
7.	<p>(a) <math>\Sigma t = 169; \Sigma c = 357</math>  <math>S_{cc} = 14245 - \frac{357^2}{10} = 1500.1</math>  <math>S_{tt} = 168.9, S_{ct} = 492.7</math>  <math>r = \frac{492.7}{\sqrt{1500.1 \times 168.9}}</math>  <math>= 0.97883\dots</math></p> <p>(b) Since <math>r</math> close to 1, value supports use of regression line</p> <p>(c) <math>b = \frac{S_{ct}}{S_{tt}} = \frac{492.7}{168.9} = 2.91711\dots</math>  <math>a = \bar{c} - b\bar{t} = \frac{357}{10} - \frac{492.7}{168.9} \times \frac{169}{10} = -13.59917\dots</math>  <math>c = -13.6 + 2.92t</math></p> <p>(d) 3 extra ice-creams are sold for every 1 °C increase in temperature</p> <p>(e) <math>c = -13.6 + 2.92 \times 16 = 33.12</math>                      i.e. 33 ice-creams</p> <p>(f) Temperature likely to be outside range of validity</p>	<p>M1 A1                      A1, A1                      M1 A1                      A1 (7)                      B1 B1 (2)                      B1                      B1                      B1 (3)                      B1 (1)                      M1 A1                      A1 (3)                      B1 (1)                      (17 marks)</p>