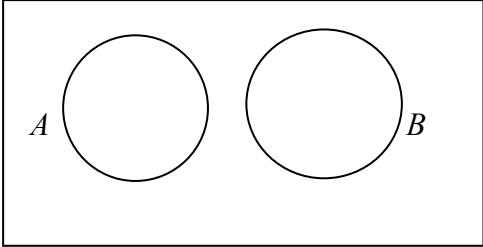
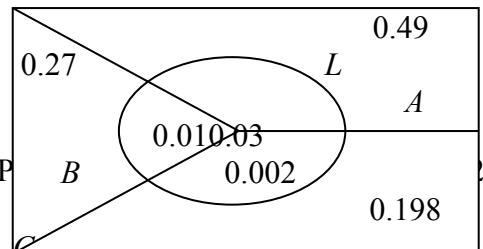
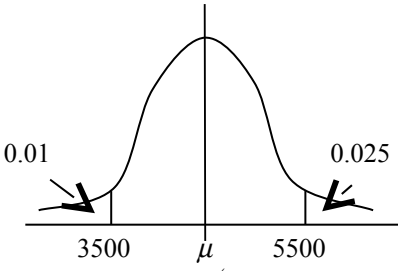


EDEXCEL STATISTICS S1 (6683) - JUNE 2002
PROVISIONAL MARK SCHEME

Question Number	Scheme	Marks
1.	$P(\text{Not } 6) = 1 - \frac{1}{6} = \frac{5}{6}$ $P(6 \text{ on third throw}) = \frac{5}{6} \times \frac{5}{6} \times \frac{1}{6} = 0.116$ $= \frac{25}{216} = 0.1157\dots \text{ (accept 0.116)}$ 3 probabilities multiplied	B1 (1) M1 A1ft A1 (3) (4 marks)
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) (4 marks)
3.	(a) $P(B A)$ = Probability of B, given A has occurred (b)  ϵ A B $A \& B$ no overlap $P(\text{Amber is late}) = 0.5 \times 0.02 = 0.01$ (e)  complete diagram 0.49; 0.01 0.198; 0.002 0.27; 0.03 intersections, three of them added	B1, B1 (2) B1 B1 (2) M1 A1 cao (2) M1 B1 B1 B1 (4) M1 A1 cao (2) (12 marks)

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

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PROVISIONAL MARK SCHEME

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

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

awrt = anything which rounds to

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

Question Number	Scheme	Marks
7.		
(a)	$\Sigma t = 169; \Sigma c = 357$ $S_{cc} = 14245 - \frac{357^2}{10} = 1500.1$ $S_{tt} = 168.9, S_{ct} = 492.7$ $r = \frac{492.7}{\sqrt{1500.1 \times 168.9}}$ $= 0.97883...$	M1 A1 A1, A1 M1 A1
	accept 0.979	A1 (7)
(b)	Since r close to 1, value supports use of regression line	B1 B1 (2)
(c)	$b = \frac{S_{ct}}{S_{tt}} = \frac{492.7}{168.9} = 2.91711...$ $a = \bar{c} - b\bar{t} = \frac{357}{10} - \frac{492.7}{168.9} \times \frac{169}{10} = -13.59917...$ $c = -13.6 + 2.92t$	B1 B1 (3) B1 (1)
(d)	3 extra ice-creams are sold for every 1 °C increase in temperature	M1 A1
(e)	$c = -13.6 + 2.92 \times 16 = 33.12$ i.e. 33 ice-creams	A1 (3)
(f)	Temperature likely to be outside range of validity	B1 (1)
		(17 marks)