Question	Answer	Marks
1	Est $\mu = 15.56$	B1
	Est $\sigma^2 = \frac{100}{99}\left(\frac{29004}{100} - "15.56"^2\right)$ or $= \frac{1}{99}\left(29004 - \frac{1556^2}{100}\right)$	M1
	$48.4105 = 48.4$ (3 sf)	A1
		3

Question	Answer	Marks
2	$Y - W - X \sim \text{N}(90, \ldots)$	B1
	$\text{Var}(Y - W - X) = 1050 + 450 + 720$ or 2220	B1
	$\frac{0-90}{\sqrt{'2220'}}$ $(= -1.910)$	M1
	$\Phi(\text{'}-1.910\text{'}) = 1 - \Phi(\text{'}1.910\text{'})$	M1
	0.0281	A1
		5

Question	Answer	Marks
3	H_0: $\lambda = 104$ (or 5.2) H_1: $\lambda > 104$ (or 5.2)	**B1**
	N(104, 104) stated or implied	**B1**
	$\frac{124.5 - 104}{\sqrt{104}}$	**M1**
	2.010	**A1**
	2.010 > 1.96	**M1**
	There is evidence that λ has increased	**A1**
		6

Question	Answer	Marks
4(a)	$\lambda = 3$	**B1**
	$e^{-3}(1 + 3)$	**M1**
	= 0.199 (3 sf)	**A1**
		3

Question	Answer	Marks
4(b)	$P(A_1 = 1 \text{ and } A_1 + A_2 < 2) = P(A_1 = 1) \times P(A_2 = 0)$	M1
	$e^{-1.5} \times 1.5 \times e^{-1.5} = 0.0747$	A1
	$P(A_1 = 1 \mid A_1 + A_2 < 2) = \dfrac{P(A1 = 1 \text{ and } A1 + A2 < 2)}{P(A1 + A2 < 2)}$ $= \dfrac{1.5 \times (e^{-1.5})^2}{4e^{-3}} = \dfrac{'0.0747'}{'0.199'}$	M1
	$\dfrac{3}{8}$ or 0.375 (3 sf)	A1
		4
4(c)	Takes negative values	B1
		1

Question	Answer	Marks
5(a)	$p = \dfrac{70}{500}$ or 0.14	B1
	$z = 2.576$	B1
	$"0.14" \pm z \times \sqrt{\dfrac{"0.14"(1 - "0.14")}{500}}$	M1
	0.100 to 0.180	A1
		4

Question	Answer	Marks
5(b)	0.1666... is within confidence interval Belief supported or justified	B1
		1
5(c)	$z \times \sqrt{\frac{"0.14"(1-"0.14")}{500}} = 0.02$	M1
	$z = 1.289$	A1
	Φ('1.289') = 0.9013	M1
	α = '0.9013' – (1 – '0.9013')	M1
	80.3% (3 sf)	A1
		5

Question	Answer	Marks
6(a)	7.5	B1
		1
6(b)	$\frac{6}{125}\int_5^{10}(-x^4+15x^3-50x^2)\mathrm{d}x$	M1
	$\frac{6}{125}\left[-\frac{x^5}{5}+15\frac{x^4}{4}-50\frac{x^3}{3}\right]_5^{10} - '7.5'^2$	M1
	1.25 (3 sf)	A1
		3

Question	Answer	Marks
6(c)	$\frac{6}{125}\int_5^6(-x^2+15x-50)\mathrm{d}x$ $\frac{6}{125}\left[-\frac{x^3}{3}+15\frac{x^2}{2}-50x\right]_5^6$	**M1**
	$\frac{6}{125}(-102+\frac{625}{6})$ oe	**M1**
	0.104	**A1**
	$2\times('0.104'\times(1-'0.104')$	**M1**
	0.186 (3 sf)	**A1ft**
		5

Question	Answer	Marks
7(a)	Later customers might spend times different from first ones	**B1**
		1
7(b)	0.02	**B1**
	Concluding that $\mu\neq6.0$, when actually $\mu=6.0$	**B1**
		2

Question	Answer	Marks
7(c)	H_0: $\mu = 6.0$ H_1: $\mu \neq 6.0$	B1
	$\dfrac{6.8-6.0}{\sqrt{\dfrac{4.8}{50}}}$	M1
	2.582	A1
	comp 2.326	M1
	Evidence that $\mu \neq 6.0$	A1
		5
7(d)	Population distribution unknown	B1
		1