1	Poisson	B1	
	$\lambda = 1.2$	B1	1.2 seen
	$1 - e^{-1.2}(1 + 1.2 + \frac{1.2^2}{2})$	M1	1 – Poisson P(0, 1, 2, 3) attempted, any λ, allow 1 end error
	$= 0.121$	A1 [4]	SC: using Bin, ans 0.120: B1
2	**(a)** $41.2 \pm z \times \sqrt{\frac{32.6}{50}}$	M1	
	$z = 1.96$	B1	
	[39.6, 42.8] (3 sfs)	A1 [3]	Allow any brackets or none, or < or "to" etc
	(b) $2 \times \frac{1}{16}$ or $\frac{1}{8}$ or 0.125 or 12.5%	M1	or 0.875
	$\alpha = 87.5\%$	A1 [2]	
3	**(i)** $\frac{85.7-85}{\frac{4.8}{\sqrt{n}}}$ (= 1.786)	M1	
	$n = (\frac{1.786 \times 4.8}{0.7})^2$	A1	Correct equation in n
	$= 150$	A1 [3]	
	(ii) $H_0: \mu = 85.0$ $H_1: \mu > 85.0$	B1	
	$z = 1.645$	M1	Comparison 1.786 and 1.645 Allow 1.96 if $H_1: \mu \neq 85.0$
	Evidence that μ increased	A1f [3]	Correct conc. No contradictions. ft H_1
4	**(a)** g: Area ≠ 1 or > 1	B1	
	h: pdf cannot be neg	B1 [2]	
	(b) **(i)** $\int_{10}^{15} \frac{30}{x} \, dx$	M1	Attempt integ $xf(x)$, ignore limits
	$= [30 \ln x]_{10}^{15}$	A1	Correct integrand and limits
	$= 30(\ln 15 - \ln 10)$	A1	or $30\ln(^{15}/_{10})$
	(= 30ln1.5 **AG**)	[3]	
	(ii) $\int_{10}^{m} \frac{30}{x^2} \, dx = 0.5$	M1	Integ f(x) = 0.5, limits 10 to unknown
	$\left[-30x^{-1}\right]_{10}^{m} = 0.5$	A1	Correct integrand, limits and = 0.5
	$-\frac{30}{m} - (-\frac{30}{10}) = 0.5$		
	$m = 12$	A1	
	$\int_{'12'}^{30\ln 1.5} \frac{30}{x^2} \, dx$	M1	
	$= 0.0337$ (3 sfs)	A1 [5]	

5	**(i)**	$W \sim N(2240, 848)$	B2	B1 each parameter
		$\frac{2200-2240}{\sqrt{848}}$ (= –1.374)		
		$\Phi(\text{“}-1.374\text{”}) = 1 - \Phi(\text{“}1.374\text{”})$ (= 0.0847)		
		$\frac{2300-2240}{\sqrt{848}}$ (= 2.060)		
		$\Phi(\text{“}2.060\text{”})$ (= 0.9803)	M1A1	Standardise either value and evaluate correctly
		$\Phi(\text{“}2.060\text{”}) - (1 - \Phi(\text{“}1.374\text{”}))$	M1	Correct combination of Φ's
		= 0.896 (3 sfs)	A1	
			[6]	
	(ii)	$X_1 - X_2 \sim N(0, 392)$	B1	May be implied
		$\frac{20-0}{\sqrt{392}}$ (= 1.010)	M1	
		($\Phi(\text{“}1.010\text{”}) = 0.8438$)		
		$P(X > 20) = 1 - \Phi(\text{“}1.010\text{”})$ (= 0.1562)	A1	
		$2 \times P(X > 20)$	M1	
		= 0.312 (3 sfs)	A1	
			[5]	
6	**(i)**	mean = 6.3	B1	B1 for 6.3
		$P(X \leq 1) = e^{-6.3}(1 + 6.3) = 0.0134$	M1	Allow incorrect λ in both probs
		$P(X \leq 2) = e^{-6.3}(1 + 6.3 + \frac{6.3^2}{2}) = 0.0498$	M1A1	
		CR is $X \leq 1$	A1	A1 for both values
			[5]	
	(ii)	P(Type I error) = $P(X \leq 1) = 0.0134$	B1	
			[1]	
	(iii)	$H_0: \lambda = 6.3$ $H_1: \lambda < 6.3$	B1	Can be scored in (i). Accept $\lambda = 2.1$(per month)
		3 not in CR	M1	or $P(X \leq 3) = 0.126 > 0.02$
		No evidence mean no. of injuries has decreased	A1	Correct conclusion
			[3]	
	(iv)	N(25.2, 25.2)	B2	B1 for N & $\mu = 25.2$. B1 for $\sigma^2 = 25.2$ May be implied
		$\frac{19.5-25.2}{\sqrt{25.2}}$ (= –1.135)	M1	Allow with wrong or no cc or no √
		$\Phi(\text{“}-1.135\text{”}) = 1 - \Phi(\text{“}1.135\text{”})$	M1	Correct area
		= 0.128 (3 sfs)	A1	
			[5]	