



Q	Answer	Marks
1	a) n is large and p is not too far from 0.5 ($np = 60$ and $n(1 - p) = 140$ are both large) b) mean 60, variance 42 c) 0.2437	5
2	$H_0: \mu = 45$, $H_1: \mu > 45$; $P(\bar{X} \geq 47.9) = 0.0350 < 0.05$ so reject H_0 : there is evidence that the mean delivery time has increased	4
3	a) $H_0: \mu = 28$, $H_1: \mu \neq 28$; $z = 1.78 < 1.96$ so do not reject H_0 : insufficient evidence that the mean length in the lake is different b) 0.0753	6
4	a) $\bar{X} < 19.13$ ($\bar{X} \leq 19.13$) b) 19.2 is not in the critical region, so do not reject H_0 : insufficient evidence that the mean lifetime is less than 20 hours	5
5	a) 0.1031 b) 0.1032 c) 0.14% d) 0.7159	6
6	a) 0.2585 b) 0.0820 c) $n = 400$ is large and $p = 0.72$ is not too close to 0 or 1 ($np = 288$, $n(1 - p) = 112$)	6
7	a) $n = 44$ b) the standard deviation is still 4 ml even if the mean has changed	5
8	a) $H_0: \mu = 72$, $H_1: \mu < 72$; $z = -2.3263$ so do not reject H_0 : insufficient evidence at 1% that runners have a lower mean resting heart rate b) the heart rates are normally distributed, so the mean of a random sample is also normally distributed c) yes: $-2.19 < -1.6449$, so at 5% H_0 would be rejected and there would be evidence of a lower mean	6
9	a) $H_0: \mu = 65$, $H_1: \mu \neq 65$ b) $\bar{X} = 66.44$ c) $66.5 > 66.44$ so reject H_0 : there is evidence that the mean mass of the eggs has changed d) 0.0073	7
10	a) 0.9413 b) $0.9413 < 0.95$, so the company is unlikely to achieve its aim (only about 94% of batches are accepted) c) for example, accept the batch if fewer than 52 of the sample are faulty	6
11	a) $\mu = 24.96$ b) 0.6811 c) $H_0: \mu = 24.96$, $H_1: \mu > 24.96$; $z = 1.94 < 2.3263$ so do not reject H_0 : insufficient evidence that supplier B's ropes are longer on average	9

12	<p>a) passengers often travel in groups or families, so if one does not turn up the others may not either</p> <p>b) 0.0637</p> <p>c) $H_0: p = 0.92$, $H_1: p < 0.92$; $P(X \leq 222) \approx P(Y < 222.5) = 0.0402 < 0.05$ so reject H_0: evidence that the probability of turning up has decreased</p>	10
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Full worked solutions, written out by hand, are on the solutions sheet for this topic.