Question Number	Scheme	Marks
7(a)	$X \sim \mathrm{B}(40, 0.3)$	B1
		(1)
(b)	Constant probability of buying **insurance** or Customers buy **insurance** independently	B1
		(1)
(c)	$\left[\mathrm{P}(X \,,, 7) = \mathrm{P}(X < 8) =\right] 0.0553 \quad \left[\mathrm{P}(X \,,, 6) = \mathrm{P}(X < 7) =\right] 0.0238$	M1
	So $r = 7$	A1
		(2)
(d)	B(200, 0.3) implies N(60, 42)	M1
	$\frac{t - 0.5 - "60"}{\sqrt{"42"}} = -1.62$ or $\frac{"60" - t + 0.5}{\sqrt{"42"}} = 1.62$	M1M1 B1
	[$t = 50.001\ldots$ so] $t = 50$	A1
		(5)
(e)	$\mathrm{H}_0 : p = 0.3 \quad \mathrm{H}_1 : p > 0.3$	B1
	$\left[\mathrm{P}(X \,..\, 11) =\right] 1 - \mathrm{P}(X \,,, 10)$	M1
	$= 0.0978$ or CR $\geqslant$ 11	A1
	Reject H_0/Significant/In CR	M1
	Evidence to suggest that **percentage/proportion/probability/number/amount** of customers who buy **insurance** has **increased** oe	A1ft
		(5)
	Notes	**Total 14**

(a)	**B1**	Allow Binomial $n = 40$ $p = 0.3$
(b)	**B1**	for a suitable assumption in context. Must include 'insurance' If multiple reasons given ignore any irrelevant or incorrect reasons provided, they are non-contradictory
(c)	**M1**	for either probability. May be implied by $r = 7$
	A1	Cao
(d)	**M1**	for writing or using N(60, 42) May be seen in a standardisation. If N(60, $\sqrt{42}$) written but 60 and $\sqrt{42}$ used in a standardisation then award M1
	M1	for standardising using t **or** $t - 0.5$ **or** $t + 0.5$ with their mean and their standard deviation
	M1	for a fully correct standardisation with their mean and their standard deviation
	B1	for ± 1.62 or better (calc: 1.620150314) seen or used. Must be compatible with their standardisation
	A1	Cao Do not allow $t = 50$ from incorrect working
(e)	**B1**	for both hypotheses in terms of p or π
	M1	for writing or using $1 - \mathrm{P}(X \,,, 10)$ May be implied by a correct CR
	A1	for 0.0978 or correct CR
	M1	for a correct non contextual conclusion. ft their probability/CR provided a binomial distribution is used. Do not allow contradictory statements. May be implied by a correct contextual statement on its own.
	A1ft	a correct contextual statement with words in bold (Allow equivalent statements) ft their probability/CR provided a binomial distribution is used
	SC	If a two tailed test is used, then it is possible to score B0M1A1M1A1 $\mathrm{H}_0 : p = 0.3 \quad \mathrm{H}_1 : p \neq 0.3$ B0 $\left[\mathrm{P}(X \,..\, 11) =\right] 1 - \mathrm{P}(X \,,, 10)$ or $\left[\mathrm{P}(X \,..\, 12) =\right] 1 - \mathrm{P}(X \,,, 11)$ M1 $= 0.0978$ or CR $\geqslant$ 12 A1 Do not reject H_0/Not significant/Not in CR M1 **Proportion** who buy **insurance** has not **increased** oe A1

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