

## LC 2017: PAPER 2

### QUESTION 9 (55 MARKS)

Table 1	
<b>United Kingdom EU Membership Referendum 2016</b>	
	<b>Votes</b>
Leave the EU	17 410 742
Remain a member of the EU	16 141 241
Valid votes	33 551 983
Invalid or blank votes	<b>25 359</b>
Total votes	33 577 342

#### Question 9 (a)

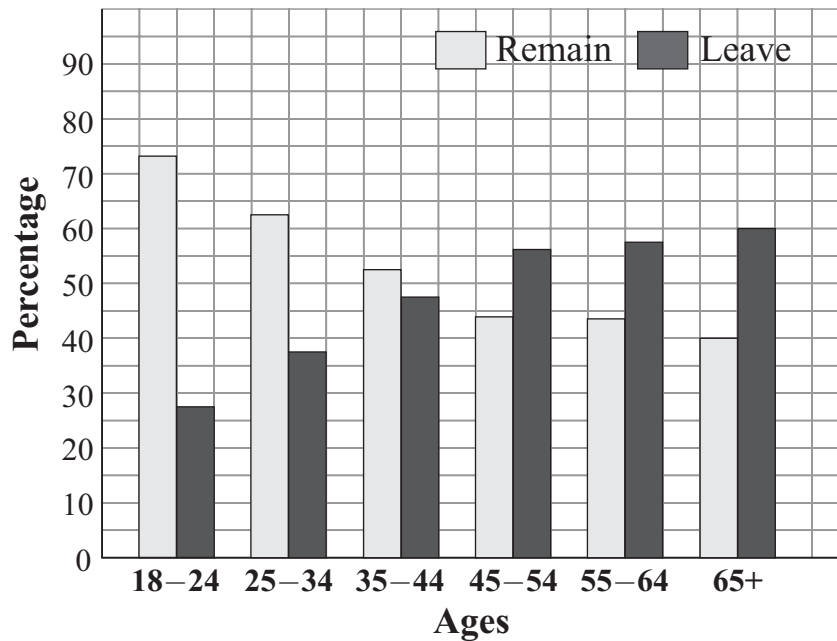
(i) Number of invalid or blank votes = Total votes – Number of valid votes  
 = 33 577 342 – 33 551 983 = 25 359

(ii) % who voted to leave EU =  $\frac{17\,410\,742}{33\,551\,983} \times 100\% \approx 52\%$

#### Question 9 (b)

Table 2		
<b>Age Group</b>	<b>Remain (%)</b>	<b>Leave (%)</b>
<b>18 – 24</b>	73	27
<b>25 – 34</b>	62	38
<b>35 – 44</b>	52	48
<b>45 – 54</b>	44	<b>56</b>
<b>55 – 64</b>	43	57
<b>65+</b>	40	60

(i) Chart:



$$(ii) \text{ Remain: Mean} = \frac{73 + 62 + 52 + 44 + 43 + 40}{6}$$

$$= 52.33\%$$

$$\text{Leave: Mean} = \frac{27 + 38 + 48 + 56 + 57 + 60}{6}$$

$$= 47.67\%$$

**FORMULAE AND TABLES BOOK**

**Statistics and probability:**

Mean from a list of  $n$  numbers

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$$\mu = \frac{\text{Sum of all the numbers}}{\text{Number of numbers}} = \frac{\sum x}{n}$$

- (iii) The true percentage of those who voted to leave is 52%.  
 The mean of the 'Leave' values from Table 2 is 47.67%.  
 These values are different because the numbers of people in each category differ.  
 For example, far fewer young people voted than older people.

**Question 9 (c)**

(i)  $n = 1200$

$$\text{Margin of error} = \frac{1}{\sqrt{n}} = \frac{1}{\sqrt{1200}} = 0.029 \approx 3\%$$

(ii) Confidence interval:  $\frac{578}{1200} - 0.03 \leftrightarrow \frac{578}{1200} + 0.03 = 0.45 \leftrightarrow 0.51$

(iii) Null hypothesis  $H_0$ : Population proportion  $p = 0.53$

Alternative hypothesis  $H_1$ : Population proportion  $p \neq 0.53$

0.53 does not lie within the confidence interval. Therefore, reject the null hypothesis and accept the alternative hypothesis.

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