

Question 8

(70 marks)

(a) An airline company *Trans-sky Airways* has designed an aptitude test for people applying for jobs as trainee pilots. The aptitude test is scored out of 500 marks. The results are normally distributed with a mean score of 280 and a standard deviation of 90.

- (i)** The top 25% of people taking the aptitude test are invited back for an interview.
Find the minimum mark needed on the test in order to be invited back for interview.

- (ii)** Anyone who scores above the 40th percentile can re-sit the test later.
Eileen scored 260 marks in the test.
Find out whether or not Eileen is eligible to re-sit the test.

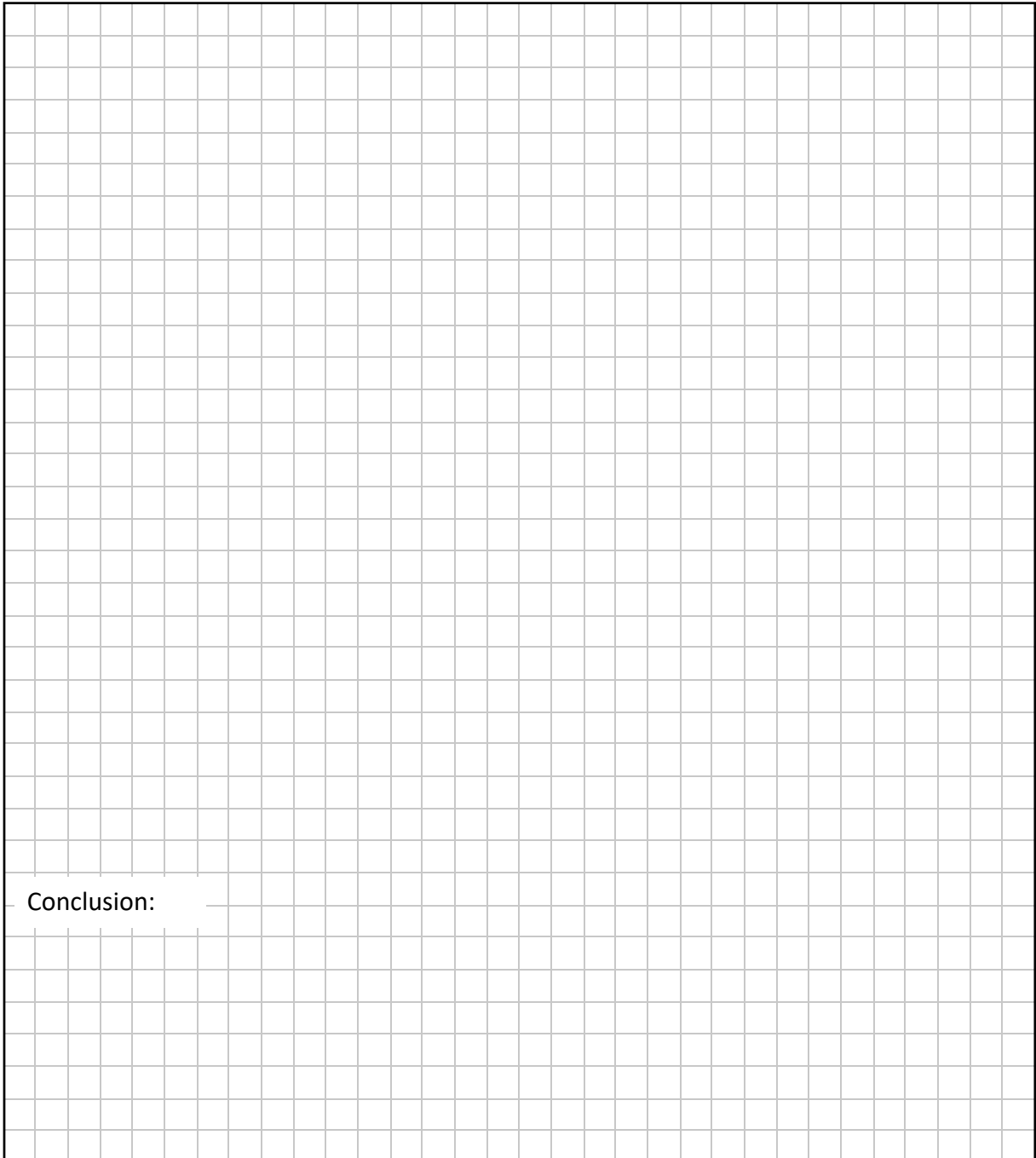
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- (b) (i) Explain the relevance of the z-scores -1.96 and 1.96 in the standard normal distribution.

- (ii) *Trans-sky Airways* surveyed 2500 of its passengers about a new service it proposed to introduce. The variable \hat{p} is the proportion of respondents in the survey who said they would use the new service.
The radius of the 95% confidence interval of the survey was 0.01568.
Find the value of \hat{p} , where $0.5 < \hat{p} \leq 1$.

- (c) The weight of the Airline passengers' carry-on luggage is normally distributed with a mean of 12 kg. The Airline has recently introduced a fee for non-carry-on luggage. After the fee was introduced, the Airline expected the mean weight of the carry-on luggage to change. They selected a random sample of 80 passengers and weighed their carry-on luggage. The sample mean was 13.1 kg and the sample standard deviation was 4.5 kg.

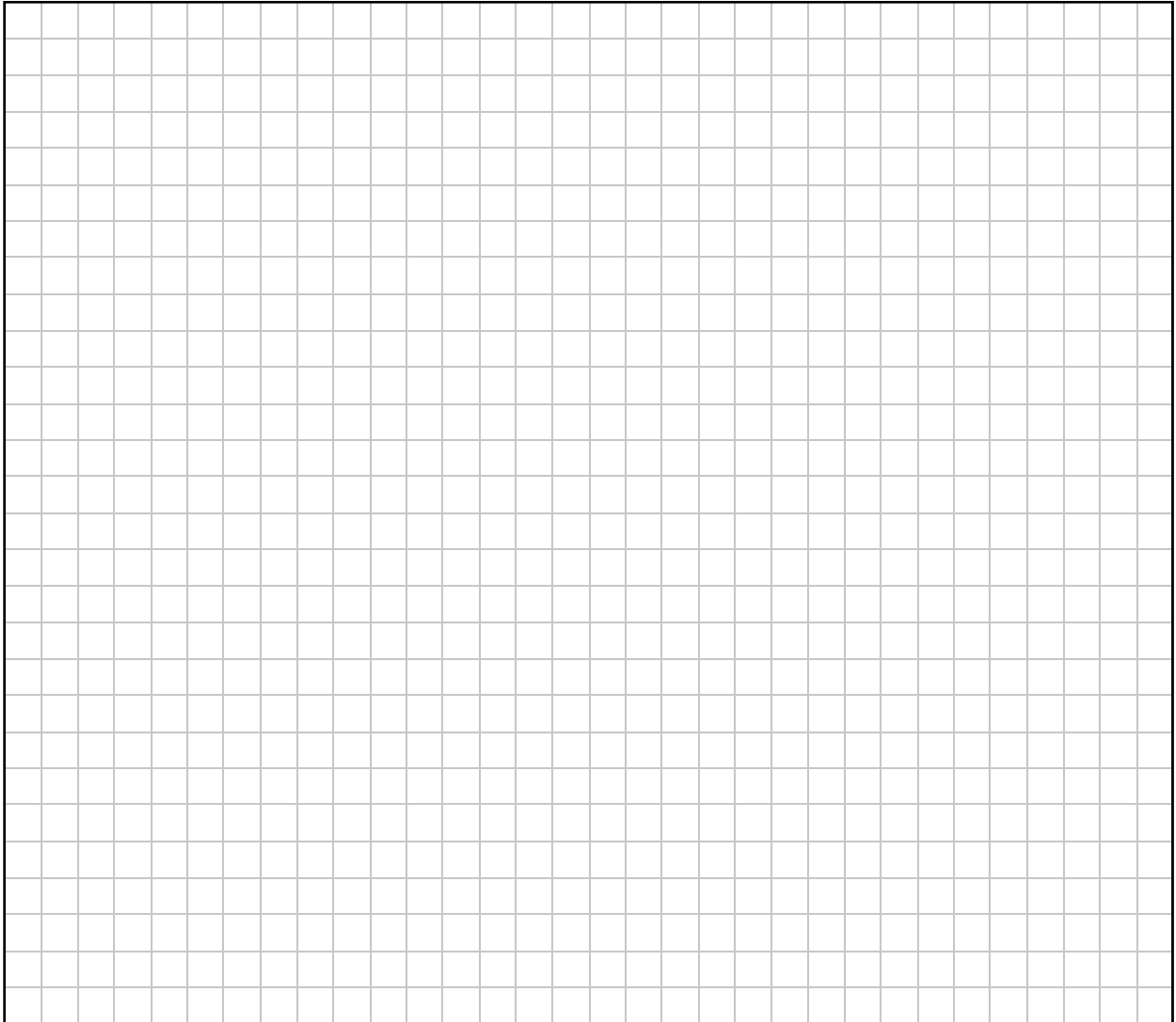
Test the hypothesis, at the 5% level of significance, that the mean weight of the carry-on luggage has changed. State the null hypothesis and the alternative hypothesis. Give your conclusion in the context of the question.



Conclusion: _____

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- (d) The company bus can carry passengers up to a total maximum weight allowance of 3000 kg. The weight of passengers is normally distributed with a mean of 73 kg and a standard deviation of 12 kg. 40 passengers board the bus. Find the probability that the total passenger weight will be over the maximum weight allowance. Give your answer as a percentage correct to 2 decimal places.



- (e) A list consists of eight whole numbers. They are labelled from A to H as shown below.
 The numbers are all greater than zero and are ordered from smallest to largest.
 The difference between any two adjacent numbers is 2 or more.
 The median of the list is 12.5 .
 The lower quartile (the median of the 4 lowest numbers) of the list is 7.5 .
 The interquartile range is 12.
 The second largest number is 23, as shown.
 The range of the list is 21.
 The mean of the list is 13.5 .

Find the numbers which satisfy all of the above conditions and write them into the boxes below.

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>
						23	