# Stress test - topic 2 and 4

1a. *[2 marks]*

Malthouse school opens at 08:00 every morning.

The daily arrival times of the 500 students at Malthouse school follow a normal distribution. The mean arrival time is 52 minutes after the school opens and the standard deviation is 5 minutes.

Find the probability that a student, chosen at random arrives at least 60 minutes after the school opens.
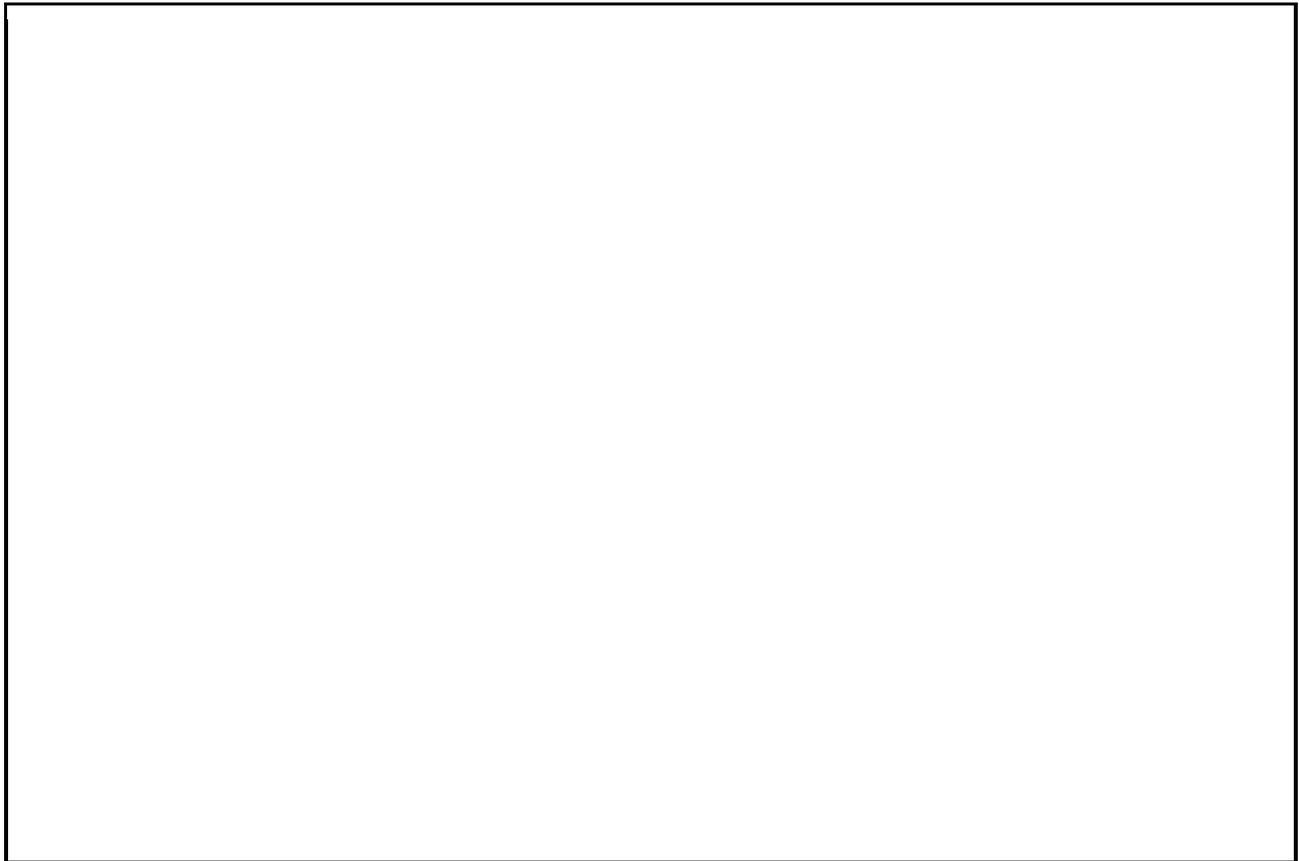
1b. *[2 marks]*

Find the probability that a student, chosen at random arrives between 45 minutes and 55 minutes after the school opens.
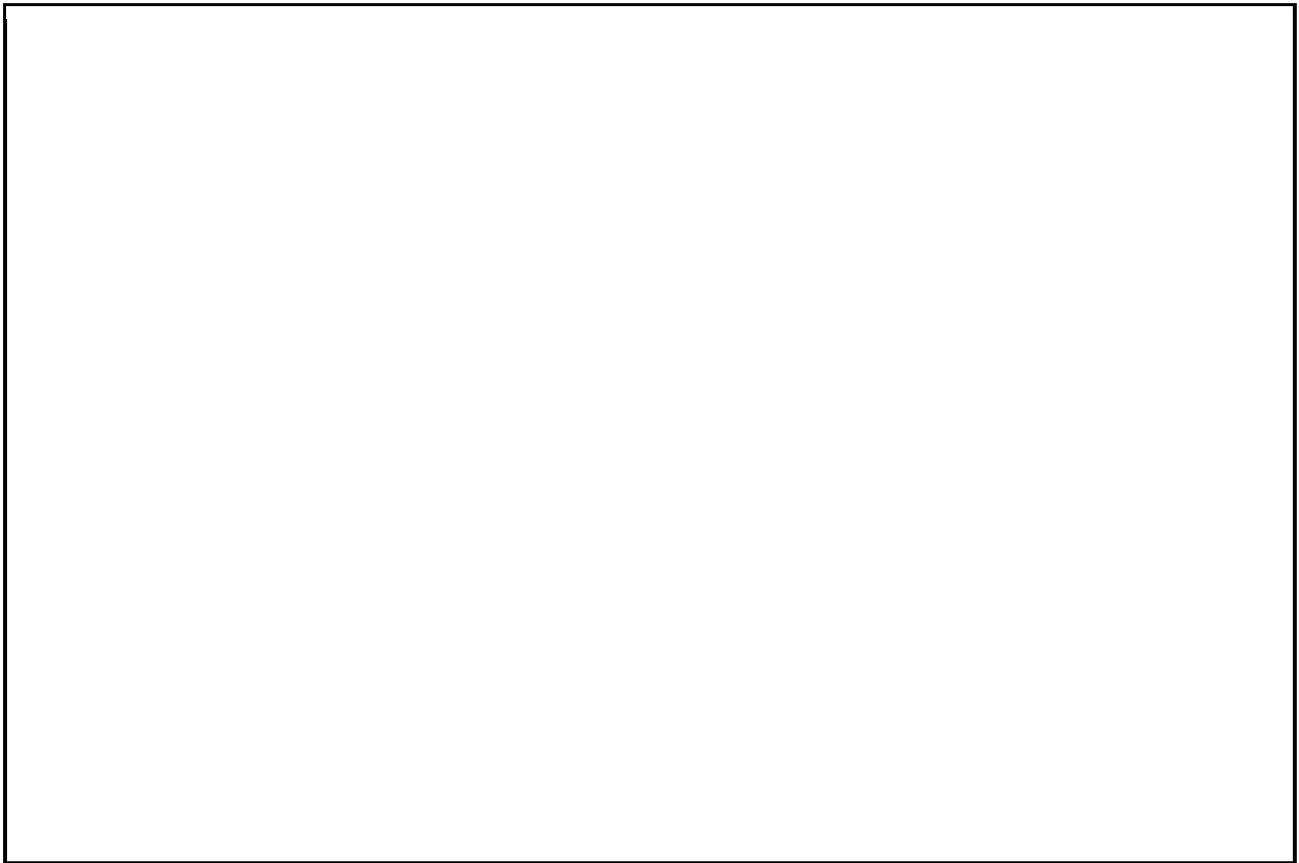
1c. *[2 marks]*

A second school, Mulberry Park, also opens at 08:00 every morning. The arrival times of the students at this school follows exactly the same distribution as Malthouse school.

Given that, on one morning, 15 students arrive at least 60 minutes after the school opens, estimate the number of students at Mulberry Park school.

2a. *[2 marks]*

Each month the number of days of rain in Cardiff is recorded.

The following data was collected over a period of 10 months.

11 13 8 11 8 7 8 14 x 15

For these data the **median** number of days of rain per month is 10.

Find the value of x.

. . . .

. . . .

. . . .

2b. *[2 marks]*

Find the standard deviation

. . . .

. . . .

. . . .

2c. *[2 marks]*

Find the interquartile range.

....

....

....
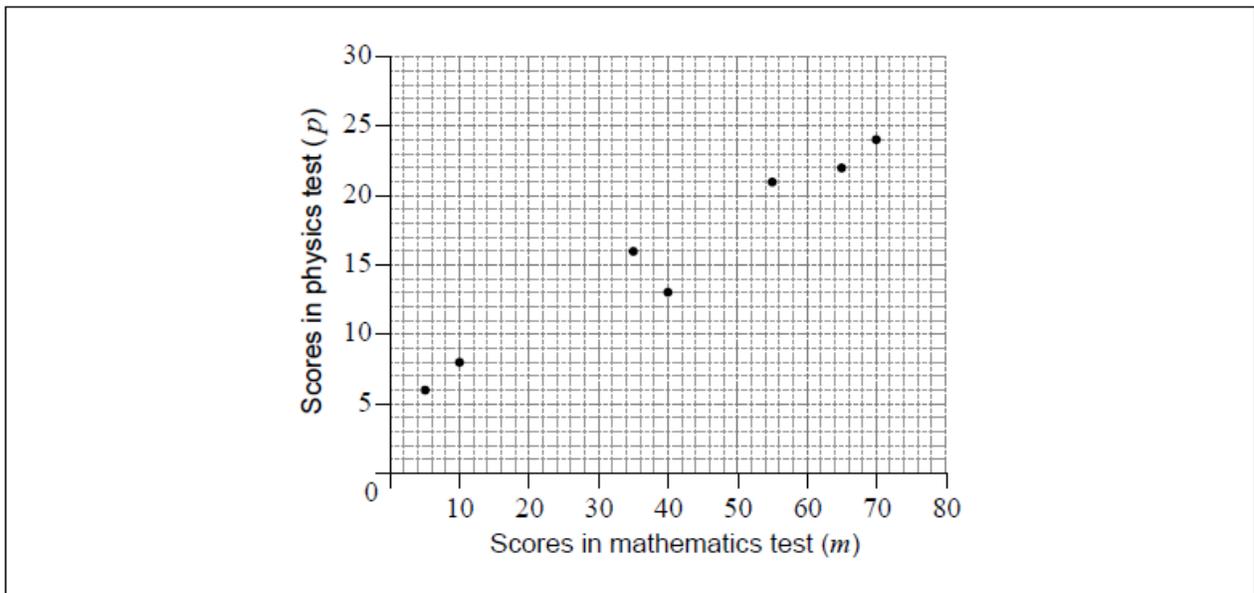
3a. *[2 marks]*

The following scatter diagram shows the scores obtained by seven students in their mathematics test, m, and their physics test, p.

The mean point, M, for these data is (40, 16).

Plot and label the point M$(\bar{m},\ \bar{p})$ on the scatter diagram.

3b. *[2 marks]*

Draw the line of best fit, by eye, on the scatter diagram.

3c. *[2 marks]*

Using your line of best fit, estimate the physics test score for a student with a score of 20 in their mathematics test.

. . . .

. . . .

. . . .

4a. *[1 mark]*

On one day 180 flights arrived at a particular airport. The distance travelled and the arrival status for each incoming flight was recorded. The flight was then classified as on time, slightly delayed, or heavily delayed.

The results are shown in the following table.

		Distance travelled			
		At most 500 km	Between 500 km and 5000 km	At least 5000 km	TOTAL
Arrival Status	On time	19	17	16	52
	Slightly delayed	13	18	14	45
	Heavily delayed	28	15	40	83
	TOTAL	60	50	70	180

A χ^2 test is carried out at the 10 % significance level to determine whether the arrival status of incoming flights is independent of the distance travelled.

State the alternative hypothesis.

. . . .

. . . .

. . . .

4b. *[2 marks]*

Calculate the expected frequency of flights travelling at most 500 km and arriving slightly delayed.

4c. *[1 mark]*

Write down the number of degrees of freedom.

4d. *[2 marks]*

Write down the χ^2 statistic.

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

4e. *[1 mark]*

Write down the associated p-value.

. . . .

. . . .

. . . .

4f. *[2 marks]*

The critical value for this test is 7.779.

State, with a reason, whether you would reject the null hypothesis.

7

4g. *[2 marks]*

A flight is chosen at random from the 180 recorded flights.

Write down the probability that this flight arrived on time.

4h. *[2 marks]*

Given that this flight was not heavily delayed, find the probability that it travelled between 500 km and 5000 km.

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

4i. *[3 marks]*

Two flights are chosen at random from those which were slightly delayed.

Find the probability that each of these flights travelled at least 5000 km.