

You have one week to complete this. What you hand in should be your best work, and you must attempt every question.

If you are stuck then please either consult notes or textbooks, attend a workshop, or ask your teacher.

You may need to refer to the formula book, found [here](#):

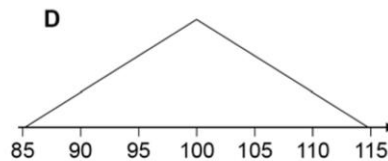
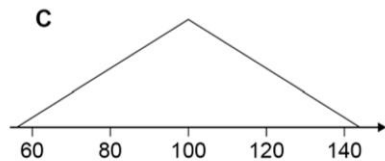
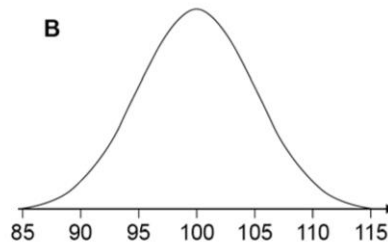
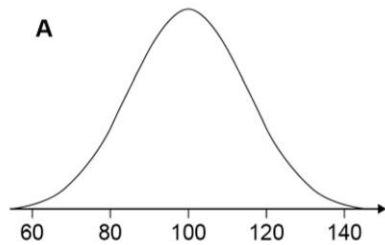


or financial information, found [here](#):



1) A normal distribution has mean 100 and standard deviation 15.

Circle the letter of the diagram that shows this distribution.



[1 mark] 3)

2) Every week, Hilda buys four apples and three bananas from her local greengrocer. The table shows the total weight, x grams, of the four apples and the corresponding total weight, y grams, of the three bananas for each of a random sample of 13 weeks.

x	562	633	578	621	558	593	607	638	527	623	579	588	524
y	366	320	379	407	422	394	325	369	387	395	446	364	457

(a) Calculate, to three decimal places, the value of the product moment correlation coefficient, r , between x and y . [3 marks]

(b) Interpret, in context, your value for r . [2 marks]

(c) Howard, Hilda's husband, claims that each week she buys either big apples and big bananas or small apples and small bananas.

Comment on Howard's claim.

[2 marks]

Laura works in a forest.

There are some yew trees in the forest.

50% of the yew trees have a height of at least 15 metres.

95% of the yew trees have a height of between 8 metres and 22 metres.

Work out estimates of the mean and standard deviation of the heights of the yew trees. Assume that the heights are normally distributed.

[3 marks]

4) (a) Kate flew to Boston. She paid £65 for UK air passenger duty. This duty was 13.4% of the cost of her return ticket to Boston.

How much did Kate pay for her return ticket to Boston?

[3 marks]

(b) In Boston, Kate paid \$192 for each night she stayed in a hotel. The exchange rate was \$1.61 to £1.

Calculate the cost, in pounds, of each night in the hotel.

[3 marks]

(c) Kate had dinner with her friend Harry. The total cost of the dinner was \$84. They agreed to divide the cost of their dinner in the ratio of 4:3, with Kate paying more.

How much, in dollars, did Kate pay?

[3 marks]

Homework 13A

- 5) The weights of tins of tomatoes produced by Smiley plc are Normally distributed with mean, 157 g and standard deviation, 3.5 g.
- (a) Within what weight limits would you expect almost all of the tins produced to fall?
- (b) The label on each tin states that the weight of tomatoes is 150g. Using the symmetry of the Normal distribution, estimate the percentage of these tins that are below 150g.
- 6) Durum wheat is the only species of wheat of commercial importance that is widely cultivated today. *Durum* in Latin means ‘hard’, and the species is the hardest of all wheats. Its high protein and gluten content, as well as its strength, make durum wheat good for special uses. The USA measures the amount of crops in bushels. One bushel is approximately 35 litres.

The table below shows the acreage, yield, production and price per bushel of durum wheat in the USA, from the year 2000 to the year 2009.

Year	Acreage (000s)		Yield per harvested acre (bushels)	Production bushels (000s)	Price per bushel (dollars)
	Planted	Harvested			
2000	3937	3572	30.7	109 805	2.66
2001	2910	2789	30.0	83 556	3.08
2002	2913	2709	29.5	79 960	4.05
2003	2915	2869	33.7	96 637	3.97
2004	2561	2363	38.0	89 893	3.85
2005	2760	2716	37.2	101 105	3.46
2006	1870	1815	29.5	53 475	4.43
2007	2156	2119	34.1	72 224	9.92
2008	2721	2574	32.6	83 827	9.26
2009	2554	2428	44.9	109 042	5.47

- (a) Calculate the mean and the standard deviation of the prices per bushel of durum wheat for the years 2000 to 2009 inclusive. Give your answers correct to three significant figures. *(3 marks)*
- (b) The mean and standard deviation of the prices per bushel of durum wheat from 1980 to 1989 are \$3.72 and \$0.678 respectively. Compare the mean and the standard deviation of the prices per bushel with those calculated in part (a). *(2 marks)*
- (c) Calculate the number of planted acres that were not harvested in the year 2000. *(1 mark)*

- 7) At a university, 70% of students are undergraduates and 30% of students are postgraduates.

Amy and Robert want to do a survey.

Amy decides to use simple random sampling to collect a sample of 100 students.

She uses the university database as a sample frame and she numbers each student on the database.

She then generates exactly 100 random numbers and uses these random numbers to select her sample.

- (a) Give **two** reasons why Amy’s method may **not** produce a sample of 100 students.

Robert decides to use quota sampling to collect a sample of 100 students.

He plans to stand outside the main building until he has interviewed 70 undergraduates and 30 postgraduates.

- (b) Give **two** advantages of using quota sampling.

- (c) Explain why this quota sample is **not** a random sample.

- 8) The table shows the number of miles travelled (thousands) and depth of tread (mm) on eight tyres of the same type.

Number of miles (thousands)	5	10	15	25	31	36	40	46
Depth of tread (mm)	7.2	6.6	6.2	4.9	4.8	3.8	3.3	2.4

- (a) Complete the scatter diagram for the data.
The first four points have been plotted for you.
- (b) For the data, the mean number of miles is 26 thousand.
- (b) (i) Work out the mean depth of tread.
- (b) (ii) Use these mean values to help you draw a line of best fit on the scatter diagram.
- (c) Use your line of best fit to estimate the depth of tread for a tyre which has travelled 20 thousand miles.
- (d) It is illegal to have less than 1.6 mm of tread on a tyre.
Use your line to estimate the number of miles travelled before a tyre becomes illegal.
- (e) Which of your answers, 13(c) or 13(d), do you think is **more** reliable?
Give a reason for your choice.
- (f) Is there likely to be a **causal** relationship between the number of miles travelled and the depth of tread?
Give a reason for your answer.

8)

