6: A company produces small bags of flour and large bags of flour.

The weight, X grams, of flour in a small bag is normally distributed with mean 502 and standard deviation 3

One of these small bags of flour is selected at random.

(a) (i) Using standardisation find $P(X > 508)$

(2)

(ii) Hence, find $P(496 < X < 508)$

(2)

A random sample of 4 small bags of flour is taken.

(b) Find the probability that exactly 2 of these small bags each contain more than 508 grams of flour.

(3)

The weight, Y grams, of flour in a large bag is normally distributed with mean 1024 and standard deviation σ

The 85th percentile for the weight of flour in a large bag is 1038.51 to 2 decimal places.

(c) Show that $\sigma = 14$ to the nearest gram.

(2)

Given that $P(X > k) = P(Y < 2k) = p$, where k and p are constants,

(d) (i) find the value of k

(ii) find the value of p

(5)

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(Total for Question 6 is 14 marks)