

Question 20

Given that the random variable X is normally distributed with mean 36 and variance 8, find

(a) the probability $P(X \leq 40)$,

(b) c such that $P(X \geq c) = 0.85$.

[5]

$$a) P(X \leq 40) = \Phi\left(\frac{40-36}{\sqrt{8}}\right) = \Phi(\sqrt{2}) \\ = 0.9213$$

$$b) \cancel{0.85} = \Phi\left(\frac{c-36}{\sqrt{8}}\right) = \Phi\left(\frac{c-36}{\sqrt{8}}\right) \\ -1.037 = \frac{c-36}{\sqrt{8}} \Rightarrow c = 38.93$$

Question 21

Bags of rice are supplied to a chain of restaurants by two different suppliers. The bags are supposed to contain 100 kg of rice, but it is known that the weight of bags from the first supplier is normally distributed with mean 102 kg, variance 5 kg^2 , while the weight of bags from the second supplier is normally distributed with mean 103 kg, variance 7 kg^2 .

One bag is selected at random from each supplier. What is the probability that the bag from the second supplier is more than 2 kg heavier than the bag from the first?

[6]

Supplier 1: $N(102, 5)$
 " 2: $N(103, 7)$

$(-1, 12)$

$$P(X > 2) = 1 - P(X \leq 2)$$

$$1 - \Phi\left(\frac{2-1}{\sqrt{12}}\right) = 1 - \Phi\left(\frac{1}{\sqrt{12}}\right) = 0.386$$