3.3) The inverse normal distribution function

Worked example

$X \sim N(30, 4)$

Find, correct to two decimal places, the values of a such that:

a. $P(X < a) = 0.7$

b. $P(X > a) = 0.45$

c. $P(24 < X < a) = 0.2$

Your turn

$X \sim N(20, 9)$

Find, correct to two decimal places, the values of a such that:

a) $P(X < a) = 0.75$

b) $P(X > a) = 0.4$

c) $P(16 < X < a) = 0.3$

a) $a = 22.0235$

b) $a = 20.76$

c) $a = 19.17$

Worked example

The IQ of a population is distributed using

$$X \sim N(100, 15^2)$$

a) Determine the IQ corresponding to the top 30% of the population.

b) Determine the interquartile range of IQs.

Your turn

Plates made using a particular manufacturing process have a diameter, D cm, which can be modelled using a normal distribution

$$D \sim N(20, 1.5^2)$$

a) Determine the diameter, x, for which 40% of plates have a diameter greater than x

b) Determine the interquartile range of the plate diameters.

a) $x = 20.38$ cm

b) 2.02 cm (2 dp)

Worked example

$X \sim N(70, 8^2)$. Using your calculator, determine:
a) a such that $P(X > a) = 0.56$
b) b such that $P(65 < X < b) = 0.3$
c) c such that $P(c < X < 66) = 0.15$
d) the interquartile range of X.

Your turn

$X \sim N(80, 7^2)$. Using your calculator, determine:
a) a such that $P(X > a) = 0.65$
b) b such that $P(75 < X < b) = 0.4$
c) c such that $P(c < X < 76) = 0.2$
d) the interquartile range of X.

a) $a = 77.303$ (3 dp)
b) $b = 82.463$ (3 dp)
c) $c = 70.34$ (2 dp)
d) 9.44 (2 dp)