Mathematics

Edexcel IAL

S1

Worksheet Answers

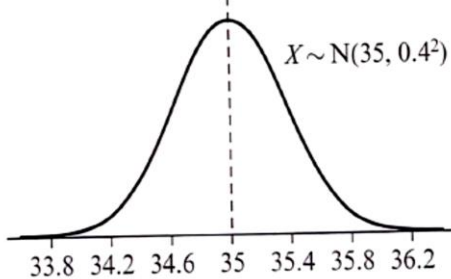## The Normal Distribution

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The Normal Distribution

Exercise 1:

1 a Continuous – lengths can take any value
 b Discrete – scores can take only certain values
 c Continuous – masses can take any value
 d Discrete – shoe sizes can take only certain values

2

$X \sim N(35, 0.4^2)$

33.8 34.2 34.6 35 35.4 35.8 36.2

3 The distribution is not symmetrical.
4 a 0.68   b 0.95
5 49
6 60 g
7 $\mu = 56.7$ (3 s.f.), $\sigma^2 = 4.69^2$ (3 s.f.)
8 a 0.5   b 0.683 (3 s.f.)   c 0.954 (3 s.f.)
 d Incorrect: although $P(X > 100) > 0$, it is very small since 100 is more than 3 standard deviations away from the mean, so the model as a whole is still reasonable.
9 a 36   b Between 2 and 3

Exercise 2:

1 a 0.102   b 0.9515   c 0.0113
 d 0.4049   e 0.0674   f 0.0522
2 a 0.9830   b 0.9131   c 0.2005
 d 0.352   e 0.4893   f 0.0516
 g 0.1823   h 0.8836

Exercise 3:

1 a −0.43   b −0.489
 c 1.22   d −0.81 and 0.81
2 a 1.33   b 1.86   c 1.0364
 d −1.6449   e 1.06   f 2.55
 g 1.2816   h 0.5244

Exercise 4:

1 a 0.9332   b 0.0062   c 0.7734
2 a 0.264   b 0.171
3 a 0.9522   b 0.7475   c 0.0038
4 32.6
5 18.1
6 a 70.6   b 80.8   c 0.075
7 a i 81.0   ii 80.6   b 0.0364
8 a 0   b −0.16   c 0.2   d 0.74
9 a $\Phi(0)$ b $\Phi(0.5)$ c $1 - \Phi(-0.25)$
  d $\Phi(0.0833) - \Phi(-1.17)$
10 a 1.96   b 87.8 (3 s.f.)
11 a −1.0364 b 54.9 cm
12 a $-1.2816 < z < 1.2816$ b 1103–1247 hours

Exercise 5:

1 11.5
2 3.87
3 31.6
4 25
5 $\mu = 13.1, \sigma = 4.32$
6 $\mu = 28.3, \sigma = 2.59$
7 $\mu = 12, \sigma = 3.56$
8 $\mu = 35, \sigma = 14.8$ or $\sigma = 14.9$
9 4.75
10 $\sigma = 1.99, a = 2.18$
11 a 203.37 mm   b 0.1504   c 0.0516
12 a 0.1299 mm   b 0.5587   c 0.0644
13 a
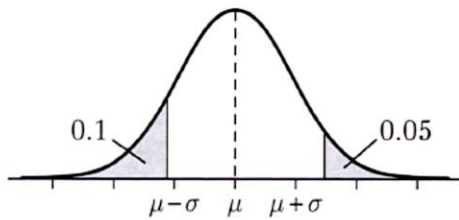
  b $\mu = 23.26, \sigma = 4.100$ c 0.4469
14 a $\mu = 16.79, \sigma = 0.9421$ b 1.27