Normal distributions and inverse probability

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A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. A scientific, statistical or financial calculator, or suitable spreadsheet, can support these calculations. Record the formula, inputs and interpretation.

What you will practise

• Normal distributions and transformed normal variables

Useful starting skills: Mathematical Methods Units 1–2 functions, algebra, probability and introductory calculus.

Write $X \sim N(\mu, \sigma^2)$, so the second parameter is variance. Standardise using $Z=(X-\mu)/\sigma$, then use a normal CDF or inverse CDF.

Normal probabilities depend on intervals. Use symmetry carefully and keep track of whether a probability is left-tail, right-tail or two-sided.

Worked example

$X \sim N(50, 16)$. Standardise $x=58$.

Variance 16 means SD 4

$(58-50)/4=2$.

Answer: $z=2$.

Try it yourself

Name: _____ Date: _____

1. For X~N(100, 225), find mean and SD.

2. For standard normal Z, find P(Z≤0) and P(Z>0).

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. 100 and 15.

Take positive square root of variance.

2. Both 0.5.

Normal distribution is symmetric about 0.

Curriculum reference: Mathematical Methods Units 3–4 — Normal distributions and transformed normal variables

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