Function families, transformations and hybrid models

Learn and practise | Free preview

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. Show the mathematical steps. A calculator, graphing tool or CAS may be used to check results where useful.

What you will practise

• Elementary functions, transformations and piecewise modelling

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

Track domain, range, intercepts, symmetry and asymptotes as a function is transformed. In $y=A\,f(n(x+b))+c$, a parent point (u, v) maps to $(u/n-b, Av+c)$.

A piecewise model needs consistent boundary definitions. Continuity requires matching limiting values and the defined value; smoothness additionally requires matching gradients.

Worked example

A graph contains (6, 2). Find its image under $y=-2\,f(3(x-1))+5$.

Solve $3(x-1)=6$ to get $x=3$

$y=-2\times2+5=1$.

Answer: (3, 1).

Try it yourself

Name: _____ Date: _____

1. State domain and asymptotes of $f(x)=\ln(x-2)+3$.

2. For $f(x)=2\,e^{(-x)}+1$, find range and y-intercept.

Answers and explanations

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

1. $x>2$; vertical asymptote $x=2$.

Logarithm requires a positive input.

2. $(1, \infty)$; $(0, 3)$.

The exponential term is positive and tends to 0 as $x \to \infty$.

Curriculum reference: Mathematical Methods Units 3–4 — Elementary functions, transformations and piecewise modelling

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