Intersecting Functions

A standard question in AQA Further Maths : You are given the plotted function g(x) and asked to find the solution of another function f(x).

Combine the two functions by adding them to produce g(x) + f(x) and miraculously be able to draw this new function on the same graph paper.

Now the intersection is
g(x) + f(x) = g(x).

The intersection is a specific value of x. However subtracting g(x) from both sides gives f(x) = 0.

Suppose instead you calculated and plotted g(x) – f(x) = g(x). The intersects will still be the solution of f(x) = 0. That almost seems a bit of sleight of hand – whether you add or subtract the unknown function f(x) from the given function g(x), the intersections are the solutions of the unknown function f(x).

So do you add or subtract? You do whichever simplifies the new function. In practice you'll have an unknown quadratic f(x) are be presented with the plot of a stated quadratic g(x).

Add or subtract whichever eliminates the x^2 term to produce a linear term.

Make sure it's g(x) – f(x) and not the "wrong" way round.

Simple Example

Suppose the unknown is f(x) = x – 5

That's not even a quadratic but let's imagine you don't know the solution but are given the plot of g(x) = 7 – 5x

Now to eliminate the x term we add the functions so g(x) + f(x) = 2.

We plot g(x) + f(x) = 2 on the graph and as if by magic the intersect is at x = 5 which is indeed the solution of f(x) = x – 5

Paper 1 June 24 Qu 20)

The given curve is $y = -x^2 + 3x + 6$ which is g(x).
You are required to find the solution of $y = x^2 - {}^7\!/_2\,x - 3$ which is f(x)

If we add the functions we get
g(x) + f(x) = ½ x + 3 and we plot this.

The intersections of g(x) and our new linear function are –0.71 and +4.21 which are indeed the solution of the given equation $f(x) = x^2 - {}^7\!/_2\,x - 3$

Summary

Given an unknown function f(x) and a given function g(x) plot a new function that eliminates the x^2 term.

Plot that linear function and the intersections are the solutions of f(x).

Robert Goodhand

Intersecting Functions

A standard question in AQA Further Maths : You are given the plotted function $g(x)$ and asked to find the solution of another function $f(x)$.

Combine the two functions by adding them to produce $g(x) + f(x)$ and miraculously be able to draw this new function on the same graph paper.

Now the intersection is $g(x) + f(x) = g(x)$.

The intersection is a specific value of x. However subtracting $g(x)$ from both sides gives $f(x) = 0$.

Suppose instead you calculated and plotted $g(x) - f(x) = g(x)$. The intersects will still be the solution of $f(x) = 0$. That almost seems a bit of sleight of hand – whether you add or subtract the unknown function $f(x)$ from the given function $g(x)$, the intersections are the solutions of the unknown function $f(x)$.

So do you add or subtract? You do whichever simplifies the new function. In practice you'll have an unknown quadratic $f(x)$ are be presented with the plot of a stated quadratic $g(x)$.

Add or subtract whichever eliminates the x^2 term to produce a linear term.

Make sure it's $g(x) - f(x)$ and not the "wrong" way round.

Simple Example

Suppose the unknown is $f(x) = x - 5$

That's not even a quadratic but let's imagine you don't know the solution but are given the plot of $g(x) = 7 - 5x$

Now to eliminate the x term we add the functions so $g(x) + f(x) = 2$.

We plot $g(x) + f(x) = 2$ on the graph and as if by magic the intersect is at $x = 5$ which is indeed the solution of $f(x) = x - 5$

Paper 1 June 24 Qu 20)

The given curve is $y = -x^2 + 3x + 6$ which is $g(x)$.
You are required to find the solution of $y = x^2 - {}^7/_2\, x - 3$ which is $f(x)$

If we add the functions we get $g(x) + f(x) = ½\, x + 3$ and we plot this.

The intersections of $g(x)$ and our new linear function are -0.71 and $+4.21$ which are indeed the solution of the given equation $f(x) = x^2 - {}^7/_2\, x - 3$

Summary

Given an unknown function $f(x)$ and a given function $g(x)$ plot a new function that eliminates the x^2 term.

Plot that linear function and the intersections are the solutions of $f(x)$.

Robert Goodhand