Lerping

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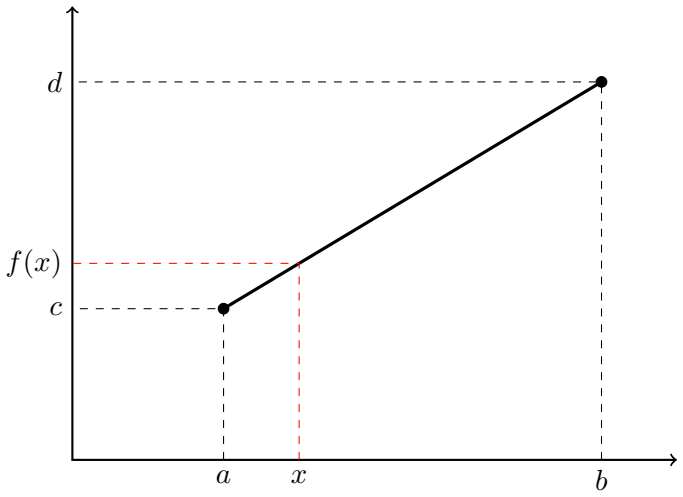

Given a point x between a and b, how can we find the corresponding point between c and d? This problem is called *linear interpolation*, or **lerp** for short. The basic problem is shown in the figure and it is easy to see why it's called *linear* interpolation. One approach is to use the two point formula for a line. The line goes from (a, c) to (b, d), so we have

$$f(x) = \frac{d-c}{b-a}(x-a) + c$$

If you don't remember the two point formula for a line, it's easy to understand what's going on. The distance between a and b is $b - a$. The distance between a and x is $x - a$. Therefore, the *fraction* of the total distance is just

$$\frac{x-a}{b-a}$$

Now, we want to cover the *same fraction* of the distance between c and d. The distance between c and d is just $d - c$. The fraction of this distance is, therefore,

$$\frac{x-a}{b-a}(d-c)$$

If we take this fraction of the distance between c and d and add it to c, we get the point we want:

$$\frac{x-a}{b-a}(d-c) + c$$

rearranging shows this to be the same number we got from the two point formula.