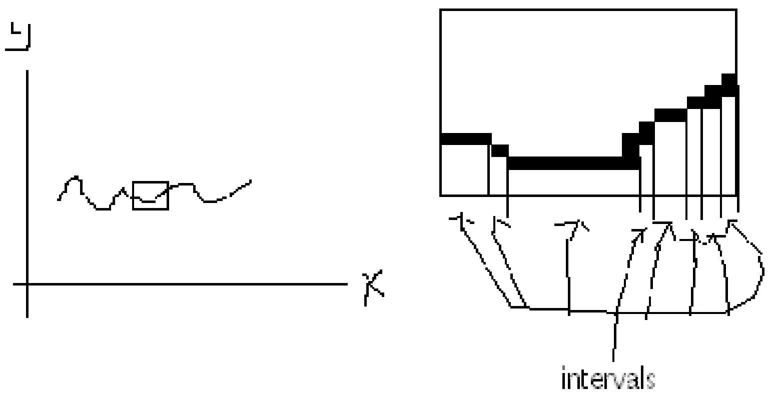
Thanks Hurkyl!

Yes, I think I understand now. Your example helped quite a bit although I had to think about it for a while.

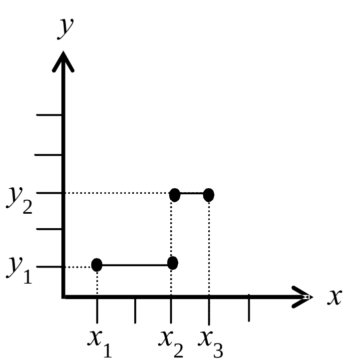
I used your example and found the general case:

$x \equiv$ manipulated variable.
$y \equiv$ responding variable.

Data can be broken down into intervals as shown below:



Graph below shows 2 intervals



Say that y is y_1 for D={x_1 , x_2} and y_2 for D={x_2 , x_3}. Numerically, the average is $\frac{y_1 + y_2}{2}$. But because the domain during $y = y_1$ is > the domain during which $y = y_2$, the **weighted** average is $\frac{y_1(x_2 - x_1) + y_2(x_3 - x_2)}{(x_2 - x_1) + (x_3 - x_2)}$.

Notice the special case: that if $x_2 - x_1 = n$ and $x_3 - x_2 = n$, then $\frac{y_1(x_2 - x_1) + y_2(x_3 - x_2)}{(x_2 - x_1) + (x_3 - x_2)}$ becomes $\frac{y_1 n + y_2 n}{n + n}$ and simplifies to $\frac{y_1 + y_2}{2}$. From this we can deduce that when all the x intervals (regardless of how many there may be) are the same, then the numerical average is equal to the weighted average.

I think what was confusing me was explaining the math in sentences. Specifically, dealing with “units of class” was throwing me off. For example, when I would setup a graph and try to describe it in words I would get something like: “More units of class were spent at 3 hours than at 5 hours”. In comparison, a statement such as “traveled 5 miles for *x* units of time and 2 miles for y units of time” makes more sense to me. To make things even more confusing, the words “were spent” refer to the units of the x-axis but in the situation dealing with classes, time refers to the units of the y-axis. It wasn’t until I found the general algebraic equation for calculating a weighted average that I really started to feel comfortable with understanding what was going on. Because the general equation is unit independent, I was able to focus on what is really happening instead of trying to understand what was going on in terms of the units. It also didn’t help that when I was calculating the low-, high-, and weighted-average I didn’t think it necessary at first to visualize the data in the table graphically—I was approaching it entirely from a symbolic/logic standpoint. In doing so, I failed to fully understand why the numerical and weighted averages should be and are different.

So, with your help, I think I’ve acquired a much better understanding of this problem. It’s something that’s plagued me off and on for a few years. I have asked about it before but you’re the first to give me a descent explanation. I feel now I can finally put it to rest and I’ve very grateful to you for that. I salute you!

~ Astro ~