Evaluating functions from tables is a skill we perform on a regular basis. We just don’t call it that. We are going to start with the basics now. At several different points in the semester, we will work on taking a function from a table and creating a formula to describe the table.

The table below gives the cumulative domestic box office for the movie “Inside Out 2”. The left column is the days the movie was in theaters. The right column is the amount of money earned in the US and Canada up to and including that date, measured in millions of dollars.

We can quickly evaluate the function B of t when the value of the independent variable, that is, the input, is on the table. For example, we can find B of 12 equals 388.0 right away. Finding B of 20 equals 496.5 is just as easy.

Where things get tricky is when we want to know values of the dependent variable, that is, the output, when the corresponding value of the independent variable isn’t on the table. For example, finding the exact value of B of 14 isn’t possible with the data we know.

We aren’t stuck when the required value of the dependent variable isn’t on the table. Notice that 14 is halfway between 12 and 16. We can use this to make an educated guess about B of 14.

As a rule, if the value x of the independent variable is halfway between two known values of the independent variable, x sub 1 and x sub 2, you can approximate the value of f of x by averaging f of x sub 1 and f of x sub 2.

Going back to our original problem, we can approximate the value of B of 14 by averaging B of 12 and B of 16. B of 12 is 388.0. B of 16 is 451.3. Adding those values and dividing by 2 gives an average of 419.65. So, our estimate of the cumulative box office of “Inside Out 2” after 14 days is 419.65 million dollars. The actual box office is 411.9 million dollars. That means we weren’t too far off in our estimate.