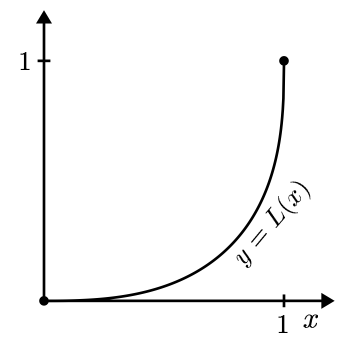
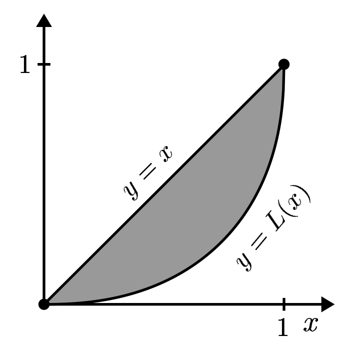
Application: Measuring the Inequality of Wealth

In *Rich and Poor* we introduced the Lorenz curve and the Gini coefficient. Recall that the Lorenz function $L(x)$ for wealth in the United States is defined as the fraction of the nation's wealth owned by the poorest x of all families. A typical Lorenz curve looks like this:



The Gini coefficent, a measure of the inequality of wealth, is defined as twice the area between the Lorenz curve and the line $y = x$,



or,

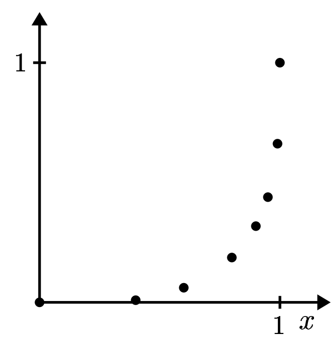
$$G = 2\left(\frac{1}{2} - \int_0^1 L(x)\,dx\right).$$

In this article we take up the task of computing G. The problem is that we don't have an expression for L in terms of x. In practice, values for L are found through surveys or the census. We never have more than a few data points. Here, for example, is the data for 1983:

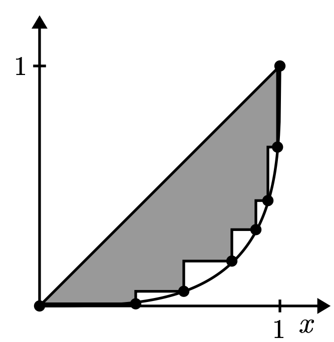
x	$L(x)$
0	0
.4	.009
.6	.061
.8	.187
.9	.318
.95	.439
.99	.662
1	1

It may be easier to think of these as percents. For example, $L(.8) = .187$ means that the poorest 80% of the nation's families have only 18.7% of the assets.

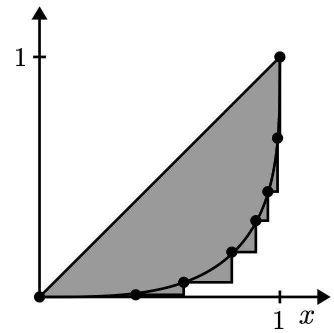
The data for 1983 looks like this on a graph:



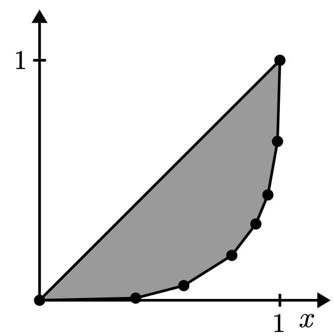
The essential problem is integrating L. This can be done using rectangles, but clearly we'll get a poor answer. If we use the left endpoint, we'll underestimate the area,



and if we use the right endpoints, we'll overestimate the area.



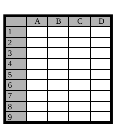
The average of these two, however, gives us an excellent approximation.



It's equivalent to the trapezoid rule.

Laboratory: Rich and Poor

In this laboratory we ask you to compute the Gini coefficient for the wealth of U.S. families in 1983. We recommend using a spreadsheet.



By the way, Simpson's rule won't work for this data, do you see why?