CPS–UIC Math Forum Gini Index

Integrals and Equity

`http://www.rethinkingschools.org/archive/19_03/inte193.shtml`

- Measuring inequality of distribution of income by the [Corrado] Gini Index
  - Lorenz Curve: Graph of Cumulative Percentage vs. Cumulative Percentage
  - Gini Index =[1] 100 × (Gini Coefficient)
  - Simple Example: If the population is divided into two groups – the *rich* 20% and the *poor* $100 - 20 = 80\%$ and the *rich* control 90% of the income, the Gini Index is $g = 90 - 20 = 70$. See Fig.2 in `http://www.cr1.dircon.co.uk/pdffiles/Lorenz.pdf` Thus the Gini Index is the incremental advantage of the *rich* population.

Gini Coefficient

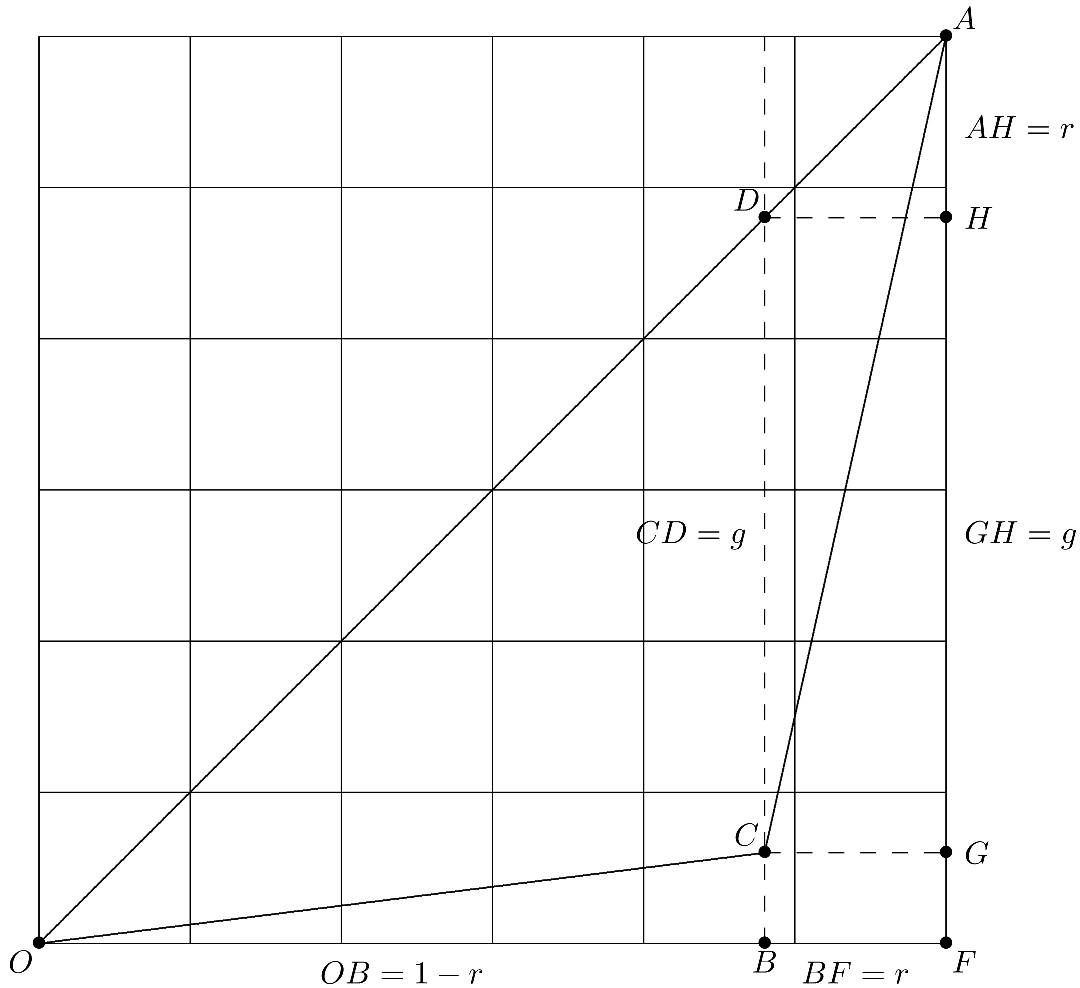
`http://en.wikipedia.org/wiki/Gini_coefficient`

- Advantages and Disadvantages of the Gini coefficient as a measure of inequality
  - Advantages: Anonymity, Scale independence, Population independence
  - Disadvantages: Units of Measurement, Households vs. Individuals, Definition of Income.
  - Policy Considerations: *FRBSF: Economic Letter – Inequality in the United States* `http://www.frbsf.org/econrsrch/wklyltr/el97-03.html`

[1] N.B. In the Staples paper, the Gini *coefficient* is called the GINI *index*.

Simple Example

Simple Example: If the population is divided into two groups – the *rich* proportion r and the *poor* proportion $1-r$ and the *rich* control an $r+g$ proportion of the the total income, the Gini Coefficient is $g = (r+g) - r$. If there was *complete equity*, the rich would control r and g represents the *incremental advantage* of the rich.



In the figure, $A = (1,1)$, $q = GH = CD$, and

$$\begin{aligned}
\text{Area}\Delta OCA &= \text{Area}\Delta OCD + \text{Area}\Delta DCA \\
&= \frac{1}{2} CD \cdot OB + \frac{1}{2} BF \cdot OB \\
&= \frac{1}{2} CD \cdot OF \\
&= \frac{1}{2} q,
\end{aligned}$$

or

$$\frac{\text{Area}\Delta OCA}{\text{Area}\Delta OFA} = q.$$