Pigou - Dalton

$x = (2, \underline{5}, \underline{9}, 20, 30)$

Progressive transfer:

take 1 from person 3

and give it to person 2

$x' = (2, 6, 8, 20, 30)$

$I(x) > I(x')$

Symmetry

$x = (2, 5, 9, 20, 30)$

$x' = (2, 20, 9, 5, 30)$

$I(x) = I(x')$

Population invariance

$x = (2, 5, 9, 20, 30)$

$x' = (2, 2, 5, 5, 9, 9, 20, 20, 30, 30)$

$I(x) = I(x')$

Scale invariance

$x = (2, 5, 9, 20, 30)$

$x' = (200, 500, 900, 2000, 3000)$

$I(x) = I(x')$

Transfer sensitivity

$x = (2, 5, 9, 20, 30)$

$X' = (\underbrace{3, 4}_{\text{reducing inequality}}, 9, \underbrace{19, 31}_{\text{increasing inequality}})$

$I(x') < I(x)$

Example 2

$x = (10, 20, 30, 40, 50)$

$x' = (11, 19, 30, 40, 50)$

$x'' = (10, 20, 30, 41, 49)$

$I(x') < I(x'')$

Subgroup Consistency

$X = (2, 5, 9, 20, 30)$

Partition income vector:

$x_A = (2, 30)$

$x_H = (5, 9, 20)$

Change $x'_A : (1, 31)$

if: $I(x'_A) > I(x_A)$

then: $I(1, 5, 9, 20, 31) > I(x)$

$$x=(2,5,9,20,30)$$

$$I_G(x) = \frac{1}{\underbrace{2N^2\mu}} \underbrace{\sum_{i=1}^{N}\sum_{j=1}^{N}|x_i - x_j|}$$

$$\underbrace{\sum_{j=1}^{N}|x_1 - x_j|} + \sum_{j=1}^{N}|x_2 - x_2| + \dots$$

$$|2-2| + |2-5| + |2-9| + |2-20| + |2-30| = 0 + 3 + 7 + 18 + 28 = 56$$

$$|5-2| + |5-5| + |5-9| + |5-20| + |5-30| = 3 + 0 + 4 + 15 + 25 = 47$$

$$|9-2| + |9-5| + |9-9| + |9-20| + |9-30| = 7 + 4 + 0 + 11 + 21 = 43$$

$$|20-2| + |20-5| + |20-9| + |20-20| + |20-30| = 18 + 15 + 11 + 0 + 10 = 64$$

$$|30-2| + |30-5| + |30-9| + |30-20| + |30-30| = 28 + 25 + 21 + 10 + 0 = 84$$

$$294$$

$N = 5$ $\quad \boxed{\mu = \frac{2+5+9+20+30}{5}} = 13.2$

$$2N^2\mu = 2(25)13.2 = 660$$

$$I_G(x) = \frac{294}{660} \approx 0.445$$