

Permutation Test Practice

Exercise : Test if car searches lead to more car ads.

	<u>Browsers</u>	<u># Car Ads</u>
Cars	1	10
	2	12
Control	3	4
	4	4

Observation $\vec{y} = \begin{bmatrix} 10 \\ 12 \\ 4 \\ 4 \end{bmatrix}$

Test Statistic: $c(\vec{y}) = \begin{matrix} \# \text{ car ads in group 1} \\ - \# \text{ car ads in group 2} \end{matrix}$

$22 - 8 = 14$

What is the significance of this effect?
(Compute using permutation test)

$\binom{4}{2} = 6$ permutations

* Order doesn't matter b/c exchangeable

$P_1 = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} = 14$

$P_4 = \begin{bmatrix} 2 \\ 3 \\ 1 \\ 4 \end{bmatrix} = 16 - 14 = 2$

$P_2 = \begin{bmatrix} 1 \\ 3 \\ 2 \\ 4 \end{bmatrix} = 14 - 16 = -2$

$P_5 = \begin{bmatrix} 2 \\ 4 \\ 1 \\ 3 \end{bmatrix} = 16 - 14 = 2$

$P_4 = \begin{bmatrix} 1 \\ 4 \\ 2 \\ 3 \end{bmatrix} = 14 - 16 = -2$

$P_6 = \begin{bmatrix} 3 \\ 4 \\ 1 \\ 2 \end{bmatrix} = 8 - 22 = -14$

p-score = $\frac{\# \text{ Perms: } c(\pi(\vec{y})) \geq c(\vec{y})}{\# \text{ Perms}} = \frac{1}{6} \approx 0.17$