Solutions

For each of the following tests, state the H_0 that should be used for its corresponding H_1

H_0: $\eta_d = 0$ H_0: $\eta_d = 0$ H_0: $\eta_d = 0$

H_1: $\eta_d > 0$ H_1: $\eta_d < 0$ H_1: $\eta_d \neq 0$

For each of the following tests, state the H_0 and H_1 that should be used

Siblings are asked to take part in an IQ test and the scores for each pair is recorded individually. Jamie believes that the older sibling will always be brighter and hence have a higher IQ score. Using a distributions free hypothesis test, test Jamie's belief at the 5% significance level.

H_0: $\eta_d = 0$

H_1: $\eta_d < 0$ (younger – older)   OR H_1: $\eta_d > 0$ (older - younger)

2 groups of volunteers take part in a trial for a new drug. Volunteers are paired based on their sex, height, weight and age. One volunteer takes the drug whilst another takes a placebo and 30mins later their heart rate is recorded. Use a Wilcoxon Signed Rank test to see if the drug has any effect on the heart rate of the volunteers.

H_0: $\eta_d = 0$

H_1: $\eta_d \neq 0$ (drug - placebo)   OR   (placebo -drug)

Parents and guardians are asked to participate in a parent and child race with their child at sports day. The time taken for each parent and child to complete the 100m obstacle race is recorded in seconds. Test the children's hypothesis that they are faster than the grown ups using a non-parametric hypothesis test at the 10% significance level.

H_0: $\eta_d = 0$

H_1: $\eta_d < 0$ (child - adult)   OR H_1: $\eta_d > 0$ (adult - child)

The weight of 8 new born babies is recorded moments after birth, 4 days later and again 7 days later. Babies are know to loose some weight between day 1 and day 4 but it is importnant that they start gaining weight again by day 7. Use a Wilcoxon Signed Rank test to test if the babies have gain weight between days 4 and 7.

H_0: $\eta_d = 0$

H_1: $\eta_d > 0$ (7days – 4days)   OR H_1: $\eta_d < 0$ (4days – 7days)