

Solutions

For each of the following pairs of hypotheses and data sets, calculate the test statistic for the sign test

Pair	A	B	C	D	E	F	G	H	I
1	20	22	24	25	21	20	23	26	27
2	21	24	25	26	23	25	24	21	25
d	-1	-2	-1	-1	-2	-5	-1	+5	+2

$$H_0: \mu_d = 0 \quad H_1: \mu_d \neq 0 \quad \bar{d} = -0.667 \quad s_d^2 = 7.75 \quad \text{Test Statistic: } -0.7184$$

Subject	A	B	C	D	E	F	G	H	I	J	K	L
before	2.5	2.6	2.8	2.4	2.1	2.0	2.3	2.5	2.6	2.8	2.7	2.2
after	2.6	2.7	2.4	2.5	2.3	2.0	2.4	2.6	2.2	2.9	2.5	2.3
d	+0.1	+0.1	-0.4	+0.1	+0.2	0	+0.1	+0.1	-0.4	+0.1	-0.2	+0.1

$$H_0: \mu_d = 0 \quad H_1: \mu_d < 0 \text{ (after - before)} \quad \bar{d} = -0.00833 \quad s_d^2 = 0.0427 \quad \text{Test Statistic: } -0.1397$$

Group	A	B	C	D	E	F	G	H	I
Test 1	56	64	52	68	64	61	57	59	61
Test 2	59	58	56	59	57	54	60	52	58
d	-3	+6	-4	+9	+7	+7	-3	+7	+3

$$H_0: \mu_d = 0 \quad H_1: \mu_d > 0 \text{ (T1 - T2)} \quad \bar{d} = 3.222 \quad s_d^2 = 26.69 \quad \text{Test Statistic: } 1.871$$

Team	A	B	C	D	E	F
Weekday	1142	1156	1132	1125	1147	1154
Weekend	1245	1084	1156	1237	1014	1162
d	-103	+72	-24	-112	+133	-8

$$H_0: \mu_d = 0 \quad H_1: \mu_d \neq 0 \quad \bar{d} = -7 \quad s_d^2 = 9274.4 \quad \text{Test Statistic: } -0.1780$$

Couple	A	B	C	D	E	F	G	H	I
Husband	8.4	6.5	2.9	4.5	7.1	2.6	5.3	8.4	7.0
Wife	7.5	7.2	7.9	6.4	7.0	4.9	5.1	7.4	7.2
d	+0.9	-0.7	-5.0	-1.9	+0.1	-2.3	+0.2	+1.0	-0.2

$$H_0: \mu_d = 0 \quad H_1: \mu_d < 0 \text{ (Husband - Wife)} \quad \bar{d} = -0.878 \quad s_d^2 = 3.669 \quad \text{Test Statistic: } -1.375$$