

(i) $H_0: M_0 = 0.265 \text{ mm}$

X_i	$X_i - M_0$	Sign	X_i	$X_i - M_0$	Sign
0.265	0	exclude	0.267	0.002	+
0.263	-0.002	-	0.267	0.002	+
0.266	0.001	+	0.265	0	e
0.267	0.002	+	0.268	0.003	+
0.267	0.002	+	0.268	0.003	+
0.265	0	e	0.263	-0.002	-

Thus $Q_- = 2, Q_+ = 7$ with $n = 9$.

Then $P[Q_- \leq 2 \mid M_0 = 0.265] = \frac{1}{2^9} \sum_{x=0}^2 \binom{9}{x} = 0.0898$

We do not reject H_0 with $P\text{-value} = 2 \times 0.0898 = 0.180$

(ii) Null hypothesis: $H_0 = 0.265$.

X_i	$X_i - M_0$	Signed Rank	X_i	$X_i - M_0$	Signed Rank
0.263	-0.002	-1.5	0.267	0.002	+5.5
0.263	-0.002	-1.5	0.267	0.002	+5.5
0.266	0.001	+3	0.267	0.002	+5.5
			0.267	0.002	+5.5
			0.268	0.003	+8.5
			0.268	0.003	+8.5

We can count that $W_- = -3$ thus $|W| = 3$

and $W_+ = 42$.

Therefore $W = \min(|W_-|, W_+) = 3$.

```
data = {0.263, 0.266, 0.267, 0.267, 0.267, 0.267, 0.268, 0.268, 0.263}
SignedRankTest[data, 0.265, "TestDataTable"]
[符号秩检验]
data = {0.263, 0.266, 0.267, 0.267, 0.267, 0.267, 0.268, 0.268, 0.263}
Statistic P-Value
Signed-Rank 36. 0.11157
```

P-value is 0.112, hence we do not reject H_0 .

iii) In both tests we don't reject H_0 .

But we see that the P-value in the signed-rank test is almost half of the P-value in the sign test.

This means that the signed-rank test is more powerful than the sign test.