1. ordered DBH's

	DBH. ordered DBH's	$\frac{i}{n+1}$	$z_{\alpha(i)} = [1 - \frac{i}{n+1}]$	$Y = \log(DBH + 1)$
1	2.5	0.05	−1.645	1.253
2	2.8	0.10	−1.282	1.335
3	3.0	0.15	−1.036	1.386
4	3.2	0.20	−0.842	1.435
5	3.2	0.25	−0.674	1.435
6	3.6	0.30	−0.524	1.526
7	3.8	0.35	−0.385	1.569
8	4.6	0.40	−0.253	1.723
9	4.7	0.45	−0.126	1.740
10	5.0	0.50	0	1.792
11	5.3	0.55	0.126	1.841
12	5.6	0.60	0.253	1.887
13	5.6	0.65	0.385	1.887
14	6.5	0.70	0.524	2.015
15	7.5	0.75	0.674	2.140
16	7.8	0.80	0.842	2.175
17	8.3	0.85	1.036	2.230
18	12.4	0.90	1.282	2.595
19	14.9	0.95	1.645	2.766

The transformation brought extreme values closer to a normal approximation. Graph looks more linear after the data is transformed.

Normal Q–Q Plot — Untransformed Data

Normal Q–Q Plot — Transformed Data
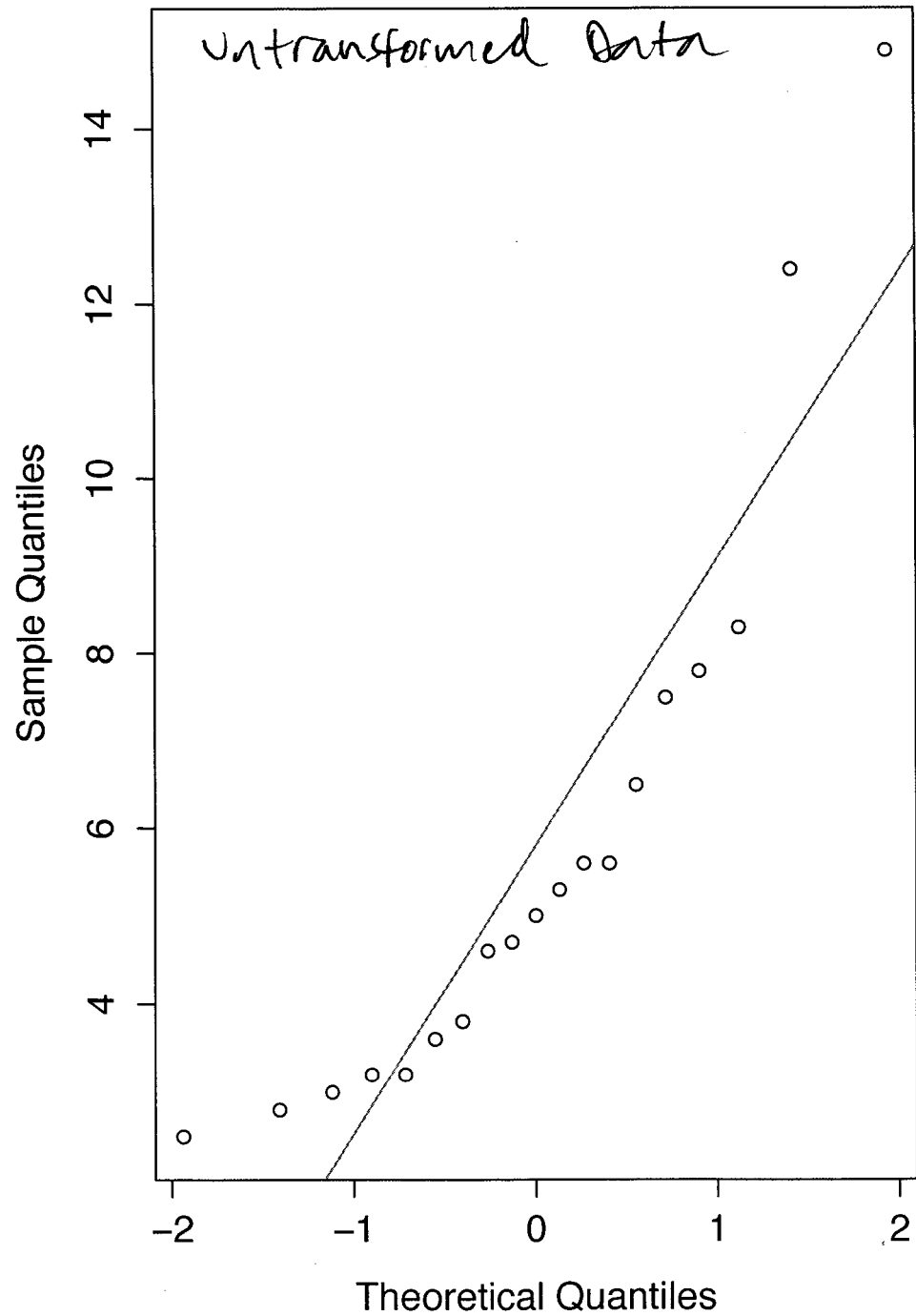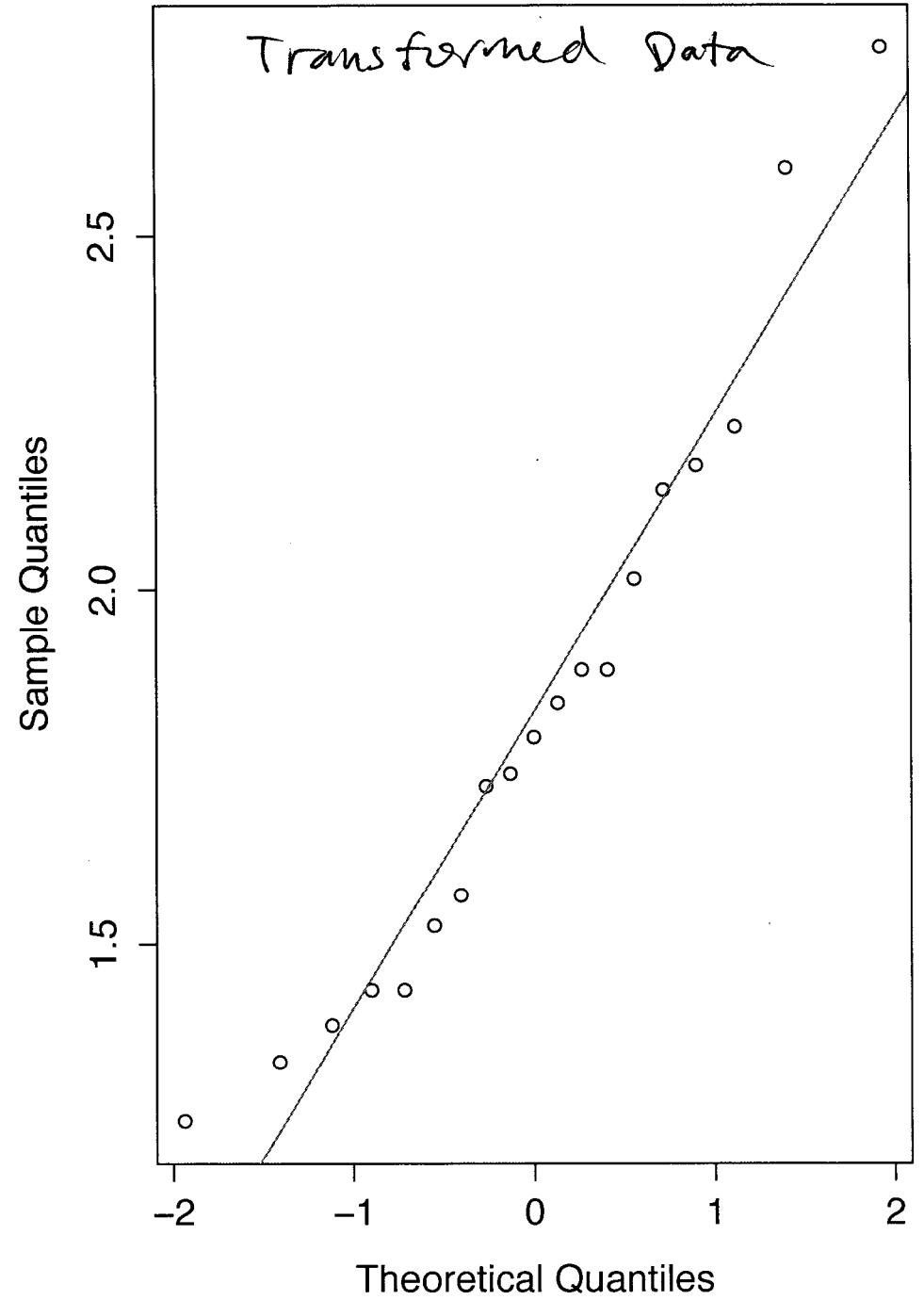
2a.

$$H_0: \Delta = 0 \qquad H_a: \Delta \neq 0$$

Females: 22.5 23 23.5 24 25 25.5 26 26.5

Ranks: 1 2 3 4 5 6 7.5 10

Males: 26 26.5 26.5 27 27.5 28 28.5 29.5

Ranks: 7.5 10 10 11 12 13 14 15

Sum of female ranks: 97.5
Sum of male ranks: 38.5

$$U_f = (8 \cdot 8) + \frac{8(8+1)}{2} - 38 = 61.5$$

$$U_m = (8 \cdot 8) + \frac{8(8+1)}{2} - 98 = 2.5$$

$$U_{max} = U_f = 61.5$$

$$U_{\alpha(2)\,8,8} = 49 \qquad \therefore \text{Reject } H_0$$

The central location of male femur lengths is different than that of female femur lengths.

Assumptions: the sampled populations have the same dispersion or shape.

The data have come at random from the sampled populations, and are independent from one another.

26.

Females	|Females - mean(females)|	Rank	(rank)²
22.5	2	14	196
23	1.5	12	144
23.5	1	8	64
24	0.5	3	9
25	0.5	4	16
25.5	1	9	81
26	1.5	13	169
26.5	2	15	225
			904

Males	|Males - mean(Males)|	Rank	(Rank)²
26	1.4375	11	121
26.5	0.9375	6	36
26.5	0.9375	7	49
27	0.4375	2	4
27.5	0.0625	1	1
28	0.5625	5	25
28.5	1.0625	10	100
29.5	2.0625	16	256
			592

2-sided
$\alpha = 0.10$

$H_0: \sigma_f^2 = \sigma_m^2$ $H_a: \sigma_f^2 \neq \sigma_m^2$

Reject H_0 if: $T_{obs} < T_{0.05,6,8} = 473$ or $T_{obs} > T_{0.95,8,8} = 1023$

Result: Do not reject H_0. There is not evidence to suggest male and female femur lengths have different variability.

3.

Worker	Standard	Ergonomiz	d	|d|	Rank	Signed Rank
1	4.9	3.9	1	1	9.5	9.5
2	4.9	4.6	0.3	0.3	3	3
3	4.6	5.6	-1	1	9.5	-9.5
4	4.6	5.2	-0.6	0.6	8	-8
5	4.4	4.4	0	0	N/A	N/A
6	4.7	4.2	0.5	0.5	6.5	6.5
7	4.8	4.4	0.4	0.4	4.5	4.5
8	5.1	4.9	0.2	0.2	2	2
9	4.7	4.8	0.1	0.1	1	-1
10	4.8	4.3	0.5	0.5	6.5	6.5
12	5.1	5.5	0.4	0.4	4.5	-4.5

$n = 10$

$T_+ = 32$ $T_{0.05(2), 10} = 8$

$T_- = 23$

Ho: There is no difference in runstitch times between the two work places.

Ha: There is a difference in runstitch times between the two workplaces.

Result: Do not reject Ho ($p > 0.50$). There is no detectable difference in runstitch times between the two workplaces.