Chapter 9 Homework

Sections 9.1 & 9.2

1. H_0: $\rho = 0$, H_1: $\rho \neq 0$; $n = 9$; $r = 0.5712$, $\alpha = 0.08$

   T.S.: $t = \dfrac{r}{\sqrt{\dfrac{1-r^2}{n-2}}} = \dfrac{0.5712}{\sqrt{\dfrac{1-0.5712^2}{9-2}}} = 1.841$

   $d.f. = 9 - 2 = 7$.

   C.V.: $t = \pm 2.046$

   p-value = $2 \cdot 0.0574 = 0.1148$

   Fail to reject the null hypothesis. The data do not give sufficient evidence to warrant rejection of the claim that the (x, y) pairs exhibit linear correlation. Because of this, it is inappropriate to give the regression line, and the best predicted value for y is $\bar{y} = (\sum y)/n = 3.62$.

3. H_0: $\rho = 0$, H_1: $\rho \neq 0$; $n = 13$; $r = 0.9721$, $\alpha = 0.05$

   T.S.: $t = \dfrac{r}{\sqrt{\dfrac{1-r^2}{n-2}}} = \dfrac{0.9721}{\sqrt{\dfrac{1-0.9721^2}{13-2}}} = 13.753$

   $d.f. = 13 - 2 = 11$.

   C.V.: $t = \pm 2.201$

   p-value = 0.0000000283 using computer software.

   Reject the null hypothesis. The data give strong evidence in support of the claim that the (x, y) pairs exhibit linear correlation. Because of this, we give the equation of the regression line $\hat{y} = -25.618 + 41.129 \cdot x$. With $x = 1.90$ we give our best estimate for y to be

   $\hat{y} = -25.618 + 41.129 \cdot 1.90 = 52.53$.

5. H_0: $\rho = 0$, H_1: $\rho \neq 0$; $n = 10$; $r = 0.7048$, $\alpha = 0.06$.

   T.S.: $t = \dfrac{r}{\sqrt{\dfrac{1-r^2}{n-2}}} = \dfrac{0.7048}{\sqrt{\dfrac{1-0.7048^2}{10-2}}} = 2.810$

   $d.f. = 10 - 2 = 8$.

   C.V.: $t = \pm 2.189$

   p-value = $2 \cdot 0.0116 = 0.0232$

   Reject the null hypothesis. The data give strong evidence in support of the claim that the (x, y) pairs exhibit linear correlation. Because of this, we give the equation of the regression line $\hat{y} = 2.5 + 0.84 \cdot x$. With $x = 22$ we give our best estimate for y to be

   $\hat{y} = 2.5 + 0.84 \cdot 22 = 20.98$.

7. H_0: ρ = 0, H_1: ρ ≠ 0; n = 35; r = 0.7076, α = 0.04

T.S.: $t = \dfrac{r}{\sqrt{\dfrac{1-r^2}{n-2}}} = \dfrac{0.7076}{\sqrt{\dfrac{1-0.7076^2}{35-2}}} = 5.752$

d.f. = 35 – 2 = 33.

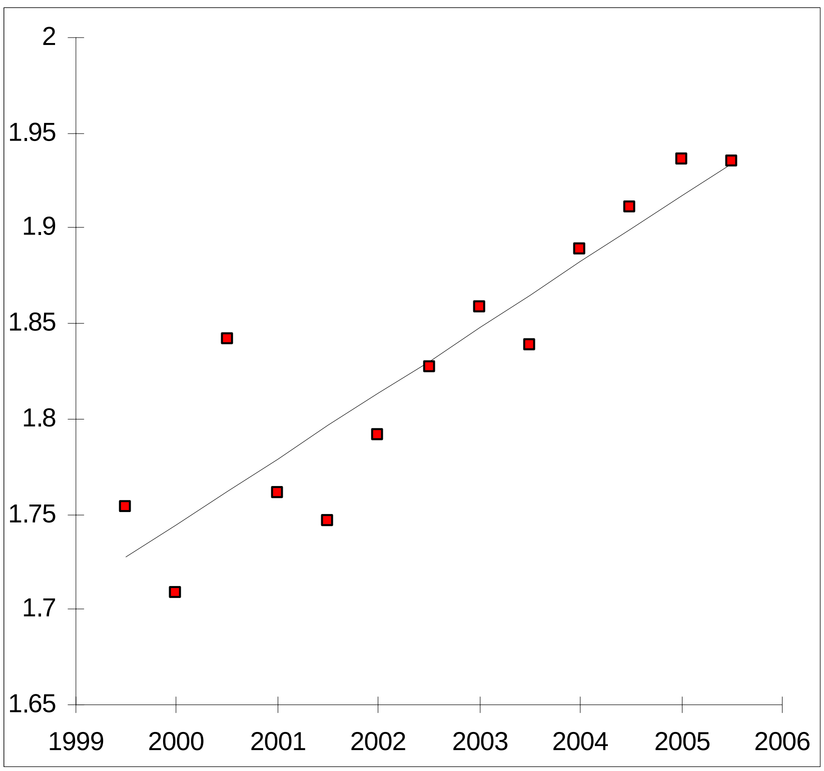
C.V.: t = ±2.138

p-value = 0.00000200 using computer software.

Reject the null hypothesis. The data give strong evidence in support of the claim that the (x, y) pairs exhibit linear correlation. Because of this, we give the equation of the regression line $\hat{y} = 35.449 + 0.462 \cdot x$. With $x = 95$ we give our best estimate for y to be

$\hat{y} = 35.449 + 0.462 \cdot 95 = 79.38$.

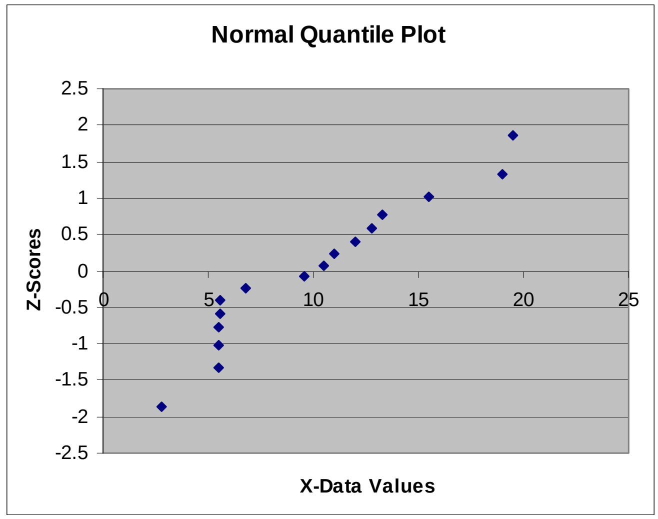
9. Because the x values are not random, we will not conduct the test for correlation which requires both x and y be random variables. Still we give $r = 0.8980$, indicating a strong positive trend, and thus the regression line, $\hat{y} = -67.164 + 0.0345 \cdot x$. The scatter-plot of these (x, y) pairs is below, with the regression line.



Section 9.5

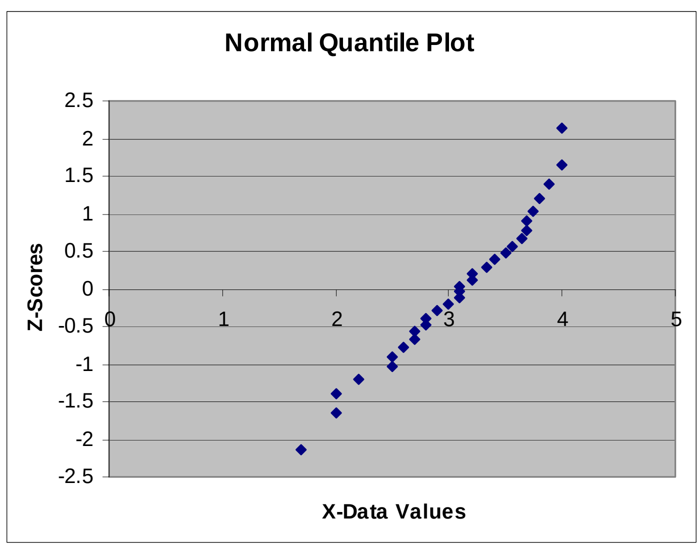
1.

SORTED Sample Data Below	Cumulative Proportion	Corresponding z-score	Sample Size	Critical Value Using α = .01
2.8	1/32	-1.862731867	16	0.915280859
5.5	3/32	-1.318010897	***r***	Sample data do not give sufficient evidence to warrant rejection of the claim that these values come from a normal population.
5.5	5/32	-1.009990169	0.963299	
5.5	7/32	-0.776421761		
5.6	9/32	-0.579132162		
5.6	11/32	-0.402250065		
6.8	13/32	-0.237202109		
9.6	15/32	-0.078412413		
10.5	17/32	0.078412413		
11	19/32	0.237202109		
12	21/32	0.402250065		
12.8	23/32	0.579132162		
13.3	25/32	0.776421761		
15.5	27/32	1.009990169		
19	29/32	1.318010897		
19.5	31/32	1.862731867		



3.

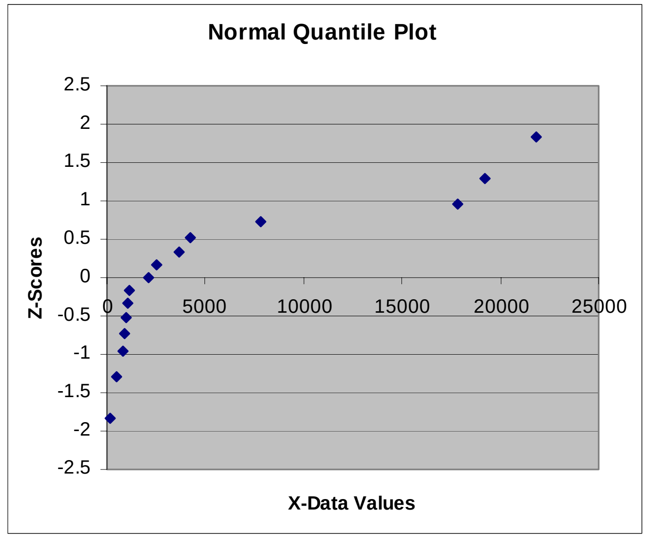
SORTED Sample Data Below	Cumulative Proportion	Corresponding z-score	Sample Size	Critical Value Using α = .01
1.7	1/60	-2.128045234	30	0.948960018
2	1/20	-1.644853627	***r***	Sample data do not give sufficient evidence to warrant rejection of the claim that these values come from a normal population.
2	1/12	-1.382994127	0.98426	
2.2	7/60	-1.191816172		
2.5	3/20	-1.036433389		
2.5	11/60	-0.902734792		
2.6	13/60	-0.783500375		
2.7	1/4	-0.67448975		
2.7	17/60	-0.572967548		
2.8	19/60	-0.477040428		
2.8	7/20	-0.385320466		
2.9	23/60	-0.296737838		
3	5/12	-0.210428394		
3.1	9/20	-0.125661347		
3.1	29/60	-0.041789298		
3.1	31/60	0.041789298		
3.2	11/20	0.125661347		
3.2	7/12	0.210428394		
3.33	37/60	0.296737838		
3.4	13/20	0.385320466		
3.5	41/60	0.477040428		
3.56	43/60	0.572967548		
3.65	3/4	0.67448975		
3.68	47/60	0.783500375		
3.68	49/60	0.902734792		
3.74	17/20	1.036433389		
3.8	53/60	1.191816172		
3.88	11/12	1.382994127		
4	19/20	1.644853627		
4	59/60	2.128045234		



5.

SORTED Sample Data Below	Cumulative Proportion	Corresponding z-score
170	1/30	-1.833914636
520	1/10	-1.281551566
790	1/6	-0.967421566
890	7/30	-0.727913291
994	3/10	-0.524400513
1039	11/30	-0.340694827
1134	13/30	-0.167894005
2124	1/2	-1.39214E-16
2531	17/30	0.167894005
3640	19/30	0.340694827
4258	7/10	0.524400513
7826	23/30	0.727913291
17833	5/6	0.967421566
19218	9/10	1.281551566
21855	29/30	1.833914636

Sample Size	**Critical Value Using α = .01**
15	0.910941337
r 0.842235866	Sample data do not support the claim that these values come from a normal population.



7.

Sample Size	**Critical Value Using α = .01**
1532	0.989373984
r 0.993677216	Sample data do not give sufficient evidence to warrant rejection of the claim that these values come from a normal population.