Los Angeles

12	30	1995	59.4
12	31	1995	59.0
12	30	1996	57.9
12	31	1996	59.1
12	30	1997	66.3
12	31	1997	61.6
12	28	1998	56.6
12	29	1998	55.2
12	30	1999	56.0
12	31	1999	54.8
12	30	2000	56.5
12	31	2000	52.2
12	30	2001	56.8
12	31	2001	56.3
12	30	2002	53.9
12	31	2002	54.2
12	30	2003	54.4
12	31	2003	54.9
12	30	2004	54.0
12	31	2004	54.3
12	30	2005	56.2
12	31	2005	55.9
12	30	2006	53.1
12	31	2006	52.1
12	30	2007	51.9
12	31	2007	55.2
12	30	2008	57.8
12	31	2008	52.9
12	30	2009	53.7
12	31	2009	54.3

New York

12	30	1995	35.8
12	30	1996	48.7
12	30	1997	38.1
12	29	1998	39.0
12	30	1999	40.6
12	30	2000	28.1
12	30	2001	29.1
12	30	2002	36.8
12	30	2003	47.3
12	30	2004	42.2
12	30	2005	44.2
12	30	2006	41.1
12	30	2007	41.7
12	30	2008	42.1
12	30	2009	23.6

#3 Hypotheses

Los Angeles:

I hypothesize the mean temperature in Los Angels during the month of December is $55^0 F$ with standard deviation of $5^0 F$

New York:

I hypothesize the mean temperature in New York during the month of December is $40^0 F$ with standard deviation of $3^0 F$

Claim: The mean temperature in Los Angeles is greater than New York.
Claim: The standard deviation of the temperatures in Los Angeles is greater than New York.

#6
1-Var Stats
<u>Los Angeles:</u>
Sample mean, $\bar{x}$ =55.8833
Sample Standard Deviation, s =3.0464
InvNorm
$60.89^0 F$ is the cutoff temperature for Los Angeles to be in the top 5%

1-Var Stats
<u>New York:</u>
Sample mean, $\bar{x}$ =38.56
Sample Standard Deviation, s =7.0260
InvNorm
$50.12^0 F$ is the cutoff temperature for New York to be in the top 5%

#7
<u>Los Angeles:</u>
ZInterval
We are 95% confident that the mean temperature of Los Angeles in December is between $54.79^0 F$ to $56.97^0 F$
<u>New York:</u>
TInterval
We are 95% confident that the mean temperature of New York in December is between $34.67^0 F$ to $42.45^0 F$

#8
<u>Los Angeles:</u>

$$x_R^2 = \frac{1-0.95}{2} = 0.025$$

$$x_L^2 = \frac{1+0.95}{2} = 0.975$$

n = 30, d.f. =29

$$x_R^2 = 45.722$$

$$x_L^2 = 16.047$$

$$\frac{(n-1)s^2}{x_R^2} < \sigma^2 < \frac{(n-1)s^2}{x_L^2}$$

$$\frac{(30-1)3.0464^2}{45.722} < \sigma^2 < \frac{(30-1)3.0464^2}{16.047}$$
$$5.8864 < \sigma^2 < 16.7717$$
$$2.4262 < \sigma < 4.0953$$

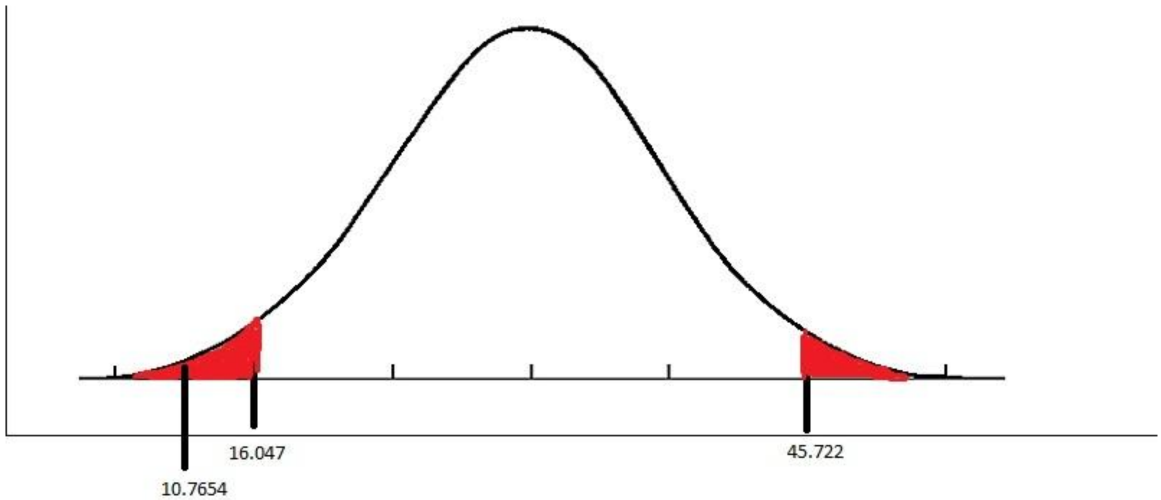
We are 95% confident that the temperature standard deviation of Los Angeles in December is between $2.43^0 F$ and $4.10^0 F$

<u>New York:</u>

#9
<u>Los Angeles:</u>
Hypothesis:
$H_0 : \mu = 55(claim)$
$H_a : \mu \neq 55$
Test Statistics:
Z-Test
$p - value = 0.1123 > \alpha = 0.05$
Conclusion:
At 5% level of significance, we failed to reject H_0. There is enough evidence to support the claim the mean temperature in Los Angels during the month of December is $55^0 F$

<u>New York:</u>
T-Test

#10
<u>Los Angeles:</u>
Hypothesis:
$H_0 : \sigma = 5(claim)$
$H_a : \sigma \neq 5$
Test Statistics:
d.f.=29
since it is **two tailed**
$\frac{1}{2}\alpha = 0.025$
$1 - \frac{1}{2}\alpha = 0.975$
$x_R^2 = 45.722$
$x_L^2 = 16.047$
$$x^2 = \frac{(n-1)s^2}{\sigma^2} = \frac{(30-1)3.0464^2}{5^2} = 10.7654$$



Conclusion:
At 5% level of significance, we reject H_0. There is not enough evidence to support the claim the standard deviation of the temperature in Los Angeles during the month of December is $5^0 F$

#11
Hypothesis:
$H_0 : \mu_1 \leq \mu_2$
$H_a : \mu_1 > \mu_2 (claim)$
Test Statistics:
2-sample T test
Pooled: No
$p - value = 3.3831E^{-8} < \alpha = 0.05$
Conclusion:
At 5% level of significance, we reject H_0. There is enough evidence to support the claim; the mean temperature in Los Angeles during the month of December is greater than mean temperature in New York.

#12
Hypothesis:
$H_0 : \sigma_1 \leq \sigma_2$
$H_a : \sigma_1 > \sigma_2 (claim)$
Test Statistics:
2-sample F Test
$p - value = 0.9999 > \alpha = 0.05$
Conclusion:
At 5% level of significance, we failed to reject H_0. There is enough evidence to support the claim; the standard deviation of the temperature in Los Angeles during the month of December is greater than the standard deviation of the temperature in New York.

New York

#13

Correlation coefficient, r = -0.09411

There is a very week negative correlation between time and temperature, almost no correlation.

#14

Hypothesis:

$H_0 : \rho = 0 (claim)$

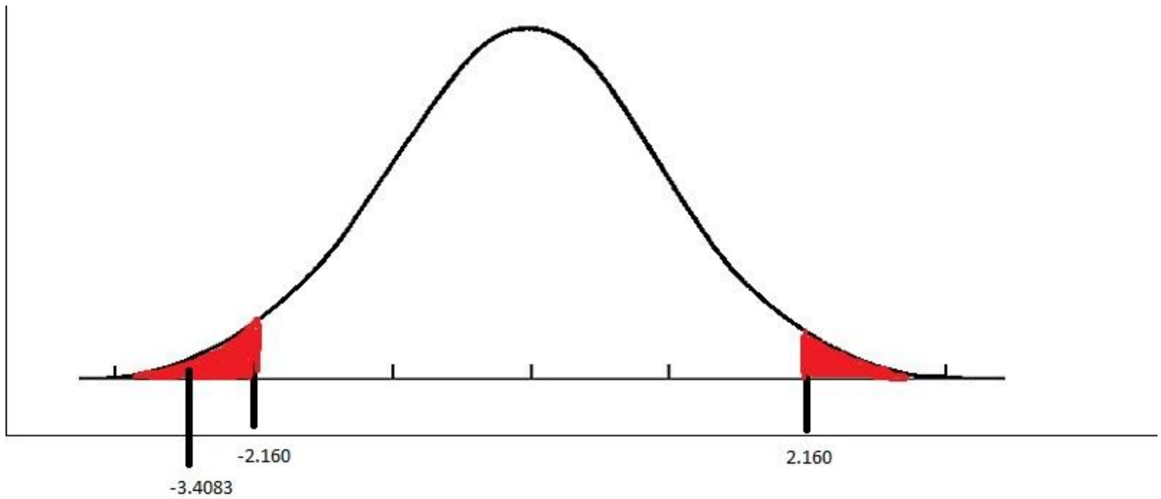
$H_a : \rho \neq 0$

Test Statistics:

$\frac{1}{2}\alpha = 0.025$

d.f.=n-2=15-2=13

$$t = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}} = -3.4083$$



Conclusion:

At 5% level of significance, we reject H_0. There is not enough evidence to support the claim; there is a correlation between time and temperature.

#15

Regression line equation

$y = -0.1479x + 334.57$

To predict temperature for 2030:

$y = -0.1479(2030) + 334.57 = 34.333$

The temperature for 2030 is $34.33^0 F$

#16

Point estimate, $\hat{y}$ for year 2030 is $34.33^0 F$

$$S_e = \sqrt{\frac{\sum(y_i - \hat{y}_i)^2}{n-2}}$$

Use

$L_1 = x$

$L_2 = y$

$L_3 = -0.1479L_1 + 334.57$

$L_4 = (L_2 - L_3)^2$

And use 1-Var Stats to find $\sum L_4 = 685.0851$

$$S_e = \sqrt{\frac{685.0851}{15-2}} = 7.2594$$

$$\varepsilon = t_c s_e \sqrt{1 + \frac{1}{n} + \frac{n(x_0 - \overline{x})^2}{n\sum x^2 - (\sum x)^2}}$$

$$\varepsilon = (2.160)(7.2594)\sqrt{1 + \frac{1}{15} + \frac{15(2030-2002)^2}{15(60120340) - (30030)^2}} = 30.8335$$

$$\hat{y} - \varepsilon < y < \hat{y} + \varepsilon$$

$$34.33 - 30.8335 < y < 34.33 + 30.8335$$

$$3.4965 < y < 65.1635$$

We are 95% confident that the temperature for New York in December for year 2030 is between $3.50^0 F$ and $5.16^0 F$

#17

The coefficient of determination, r^2 is 0.009

Only 0.9% of the variation in y (temperature) can be explained by the relationship between x (time) and y