2.

a) A Poisson distribution is a likely probability distribution, since the data involves counts of eggs.

b) For data with a Poisson distribution the square root transformation is often a good variance stabilizing transformation.

c) The slope of the LOG(SD) vs. LOG(mean) plot is $m = 0.57813$, indicating that 1-m is approximately 1/2. This agrees with the value in part (b).

[The Fmax HOV test is significant at the .05 level, although the BF HOV test has a p-value just above 0.05. Also, the QQ plot shows a heavy right tail for the distribution of the residuals.]

d) After the square root transformation [x_eggs=SQRT(eggs)] the Fmax HOV test is no longer significant and the BF HOV test is highly non-significant. The QQ plot of the residuals also looks better.

SAS output for Problem #2:

c)

Brown and Forsythe's Test for Homogeneity of eggs Variance
ANOVA of Absolute Deviations from Group Medians

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
strain	2	115941	57970.7	2.90	0.0659
Error	42	838727	19969.7		

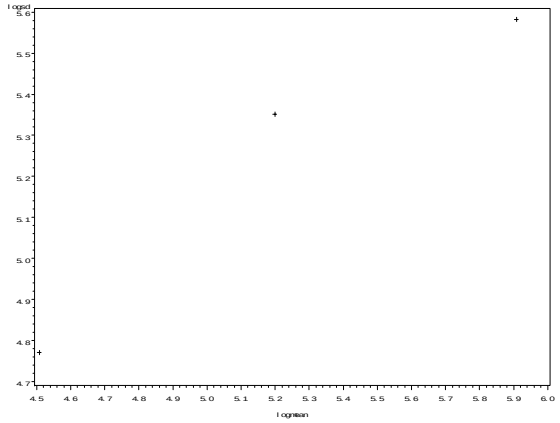
Level of strain	N	eggs Mean	eggs Std Dev
1	15	368.000000	265.621374
2	15	181.266667	210.991018
3	15	90.800000	118.106610

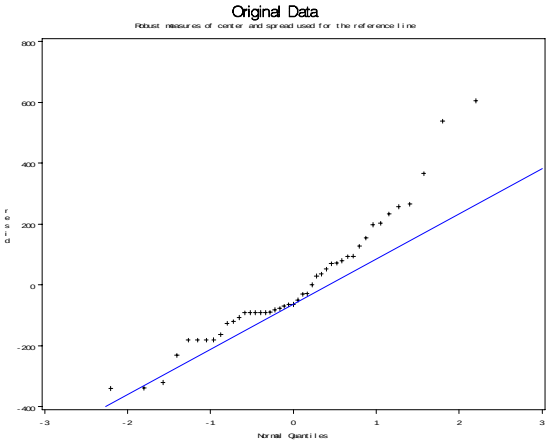
Fmax = 265.62^2/118.10^2 = 5.0585
Fmax,.05,3,15 = 3.54 (We should use df=15-1, but there is no entry in the Table)

strain	mean	sd	logmean	logsd
1	368.000	265.621	5.90808	5.58207
2	181.267	210.991	5.19997	5.35182
3	90.800	118.107	4.50866	4.77159

Least Squares Estimate of the Slope for log(SD) as a function of log(MEAN)

slope
0.57813





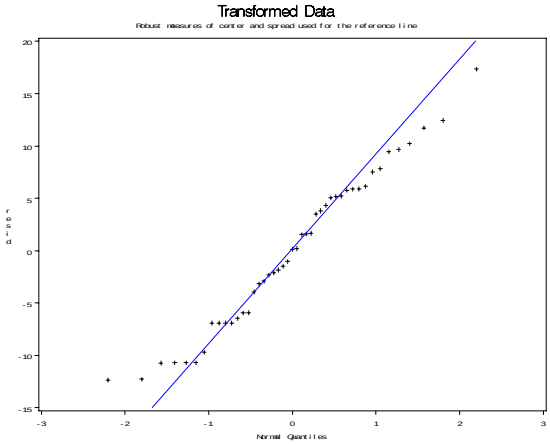
d)

Brown and Forsythe's Test for Homogeneity of x_eggs Variance
ANOVA of Absolute Deviations from Group Medians

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
strain	2	9.2690	4.6345	0.22	0.8065
Error	42	900.3	21.4352		

Level of strain	N	x_eggs Mean	x_eggs Std Dev
1	15	17.6606923	7.75287608
2	15	10.7084298	8.44707459
3	15	6.9270352	6.77307037

Fmax = 8.45^2/6.77^2 = 1.557887

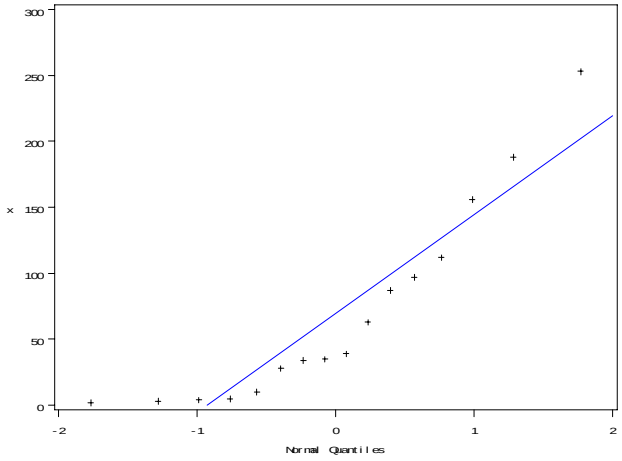


6.

a)

Obs	x	f	q_norm
1	2	0.03125	-1.86273
2	3	0.09375	-1.31801
3	4	0.15625	-1.00999
4	5	0.21875	-0.77642
5	10	0.28125	-0.57913
6	28	0.34375	-0.40225
7	34	0.40625	-0.23720
8	35	0.46875	-0.07841
9	39	0.53125	0.07841
10	63	0.59375	0.23720
11	87	0.65625	0.40225
12	97	0.71875	0.57913
13	112	0.78125	0.77642
14	156	0.84375	1.00999
15	188	0.90625	1.31801
16	253	0.96875	1.86273

b)



c)

With only 16 observations, the fit to a normal distribution looks relatively good. There are a few points in the upper right that are larger than expected from a N(0,1) distribution. There are also a few points in the lower left that are less negative (smaller absolute value) than expected from a N(0,1).