

Python 3.6.5 |Anaconda, Inc.| (default, Mar 29 2018, 13:32:41) [MSC v.1900 64 bit (AMD64)]  
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IPython 6.4.0 -- An enhanced Interactive Python.

```
In [1]: runfile('C:/Users/hoops/OneDrive/Documents/School/ME EN 2550 Statistics and  
Probability/HW5/HW5.py', wdir='C:/Users/hoops/OneDrive/Documents/School/ME EN 2550  
Statistics and Probability/HW5')
```

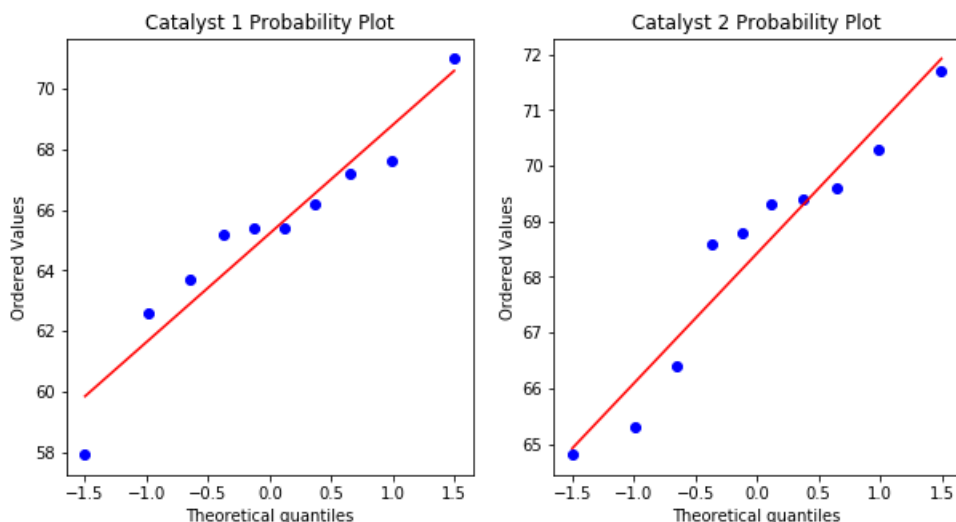
B-1:

a) 95% CI: (-5.923934526324223, -0.47606547367578234)

P-value = 0.023834179258765447

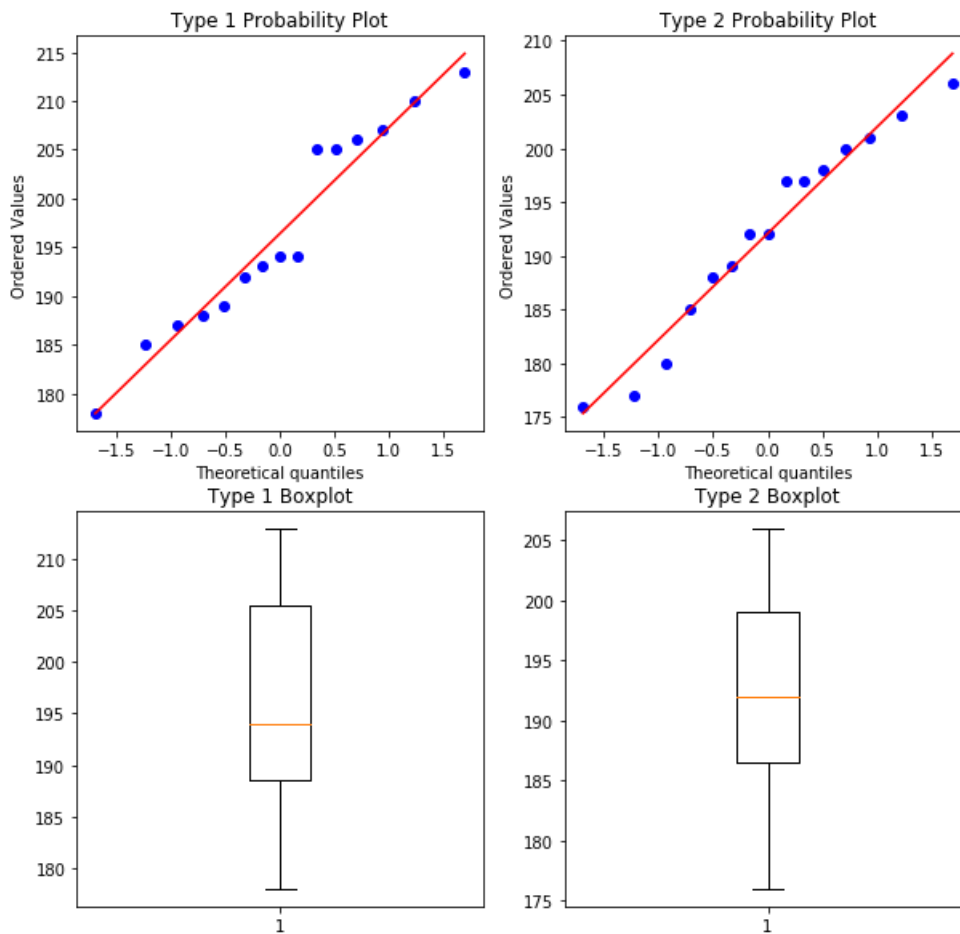
b) Yes there is evidence that the mean active concentrations depend on the choice of catalyst since the P-value for a t-test of difference of means is less than an  $\alpha = .05$  significance level and thus we reject the null hypothesis of the means being equal

c) power = 0.9408081317125466



d) The sample sizes used by the experimenter to appear to be adequate to detect a difference of 5 g/L since the power is fairly high at 0.94 which means there is a relatively small chance of a type II error. The assumption of normality is reasonable for both samples since the probability plots above are approximately linear.

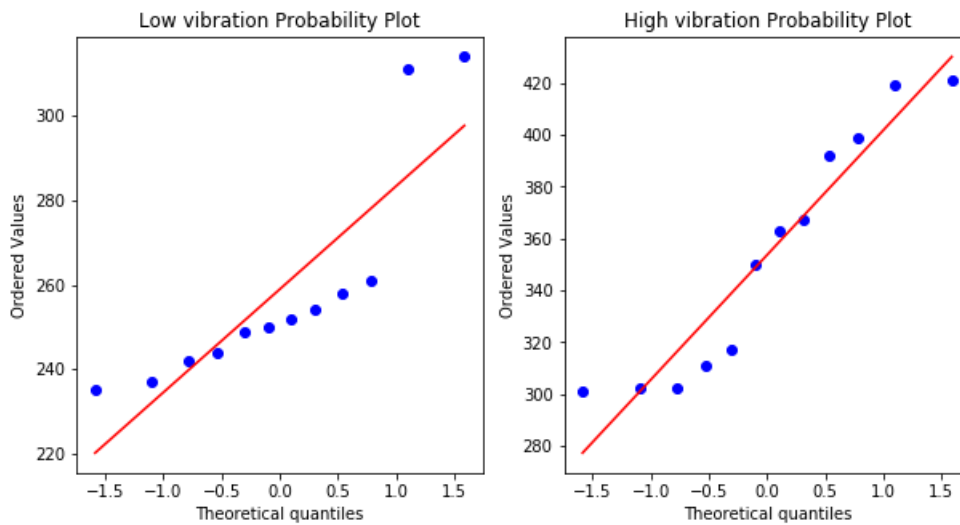
B-2:



- a) Yes, both data sets are nearly normal since they are approximately normal on a probability plot. In terms of variance they have similar variances based on the boxplots, as the boxplots are similar in size and shape
- b) Fail to reject the null hypothesis(That the temperature under load for type 1 exceeds that of type 2) since the p-value is 0.12201491253125621 which is greater than  $\alpha = .05$
- c) The given sample size is inadequate to have power of .90 for the given sample size to detect a difference of 5 degF since the power given this sample size is: 0.37 thus a bigger sample size is needed

B-3

- a) Yes there is evidence to support the claim that the mean grinding force increases with the vibration level since comparing the means of high vibration levels and low vibration levels using a one-sided t-test we get a P-value of 1.76e-06 which is  $< \alpha = .05$  so we can reject the null hypothesis that the means are the same
- b) 95% CI: (62.74078423771187, 126.75921576228814)



c) The probability plot for low vibration indicates that the data may not be normal which likely affects our ability to perform a ttest and form a confidence interval for the data since even though our high vibration data is approximately normal we are taking the difference of it and the low vibration data.

In [2]: