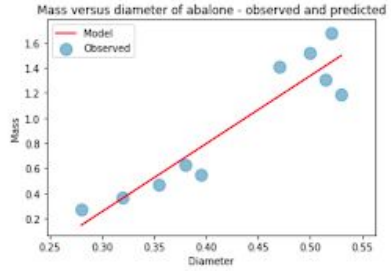
Keiana Dunn
Week 13
5/14/19

[Jupyter Lab NB]

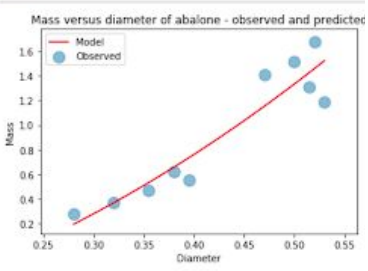
Task 1
Observed underfitting, fitting and overfitting with a simple polynomial fit.

1-3 degree polynomials are underfitting.

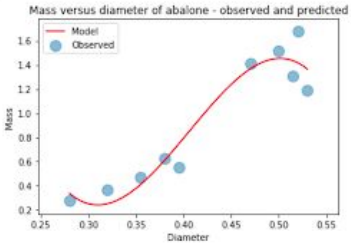


Fitted model is 1 st order
y =

5.411 x - 1.368

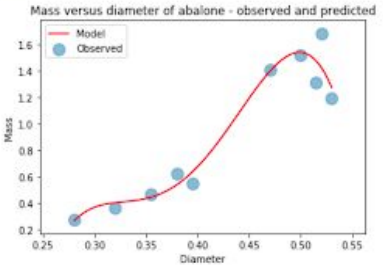


Fitted model is 2 nd order
y =
2
4.535 x + 1.648 x - 0.6226

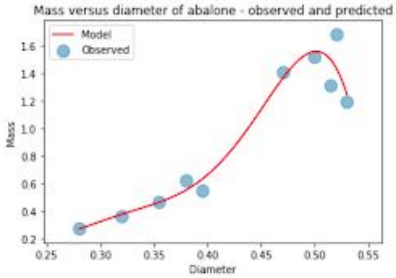


Fitted model is 3 rd order
y =
3 2
-344.5 x + 419.2 x - 160.5 x + 19.98

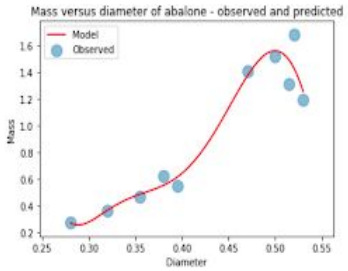
4-6 degree polynomials are fitting.



Fitted model is 4 th order
y =
4 3 2
-3637 x + 5588 x - 3151 x + 777.3 x - 70.68



Fitted model is 5 th order
y =
5 4 3 2
-1.715e+04 x + 3.103e+04 x - 2.208e+04 x + 7748 x - 1340 x + 91.67



Fitted model is 6 th order
y =
6 5 4 3 2
1.557e+05 x - 4.02e+05 x + 4.234e+05 x - 2.333e+05 x + 7.183e+04 x - 1.134e+04 x + 743.2

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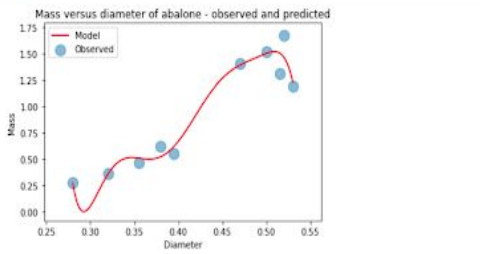
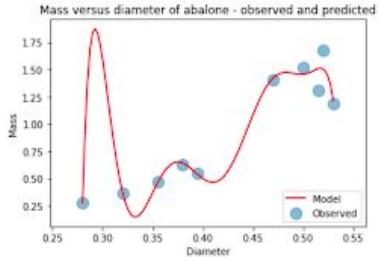
7-10 degree polynomials are overfitting.



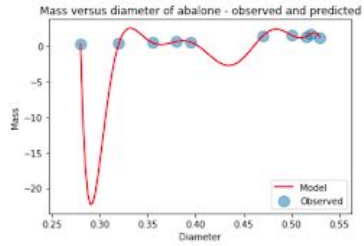
Fitted model is 7 th order
y =

$$-1.103e+07\,x^7 + 3.18e+07\,x^6 - 3.901e+07\,x^5 + 2.638e+07\,x^4 - 1.062e+07\,x^3 + 2.543e+06\,x^2 - 3.354e+05\,x + 1.879e+04$$



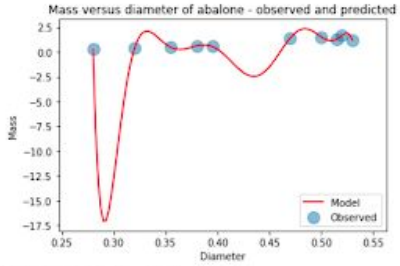
Fitted model is 8 th order
y =

$$-4.776e+08\,x^8 + 1.587e+09\,x^7 - 2.293e+09\,x^6 + 1.881e+09\,x^5 - 9.577e+08\,x^4 + 3.1e+08\,x^3 - 6.228e+07\,x^2 + 7.098e+06\,x - 3.514e+05$$



Fitted model is 9 th order
y =

$$-6.24e+10\,x^9 + 2.335e+11\,x^8 - 3.862e+11\,x^7 + 3.707e+11\,x^6 - 2.274e+11\,x^5 + 9.25e+10\,x^4 - 2.494e+10\,x^3 + 4.296e+09\,x^2 - 4.293e+08\,x + 1.895e+07$$



Fitted model is 10 th order
y =

$$-6.043e+10\,x^{10} + 1.954e+11\,x^9 - 2.589e+11\,x^8 + 1.685e+11\,x^7 - 3.753e+10\,x^6 - 2.25e+10\,x^5 + 2.142e+10\,x^4 - 8.121e+09\,x^3 + 1.7e+09\,x^2 - 1.929e+08\,x + 9.322e+06$$