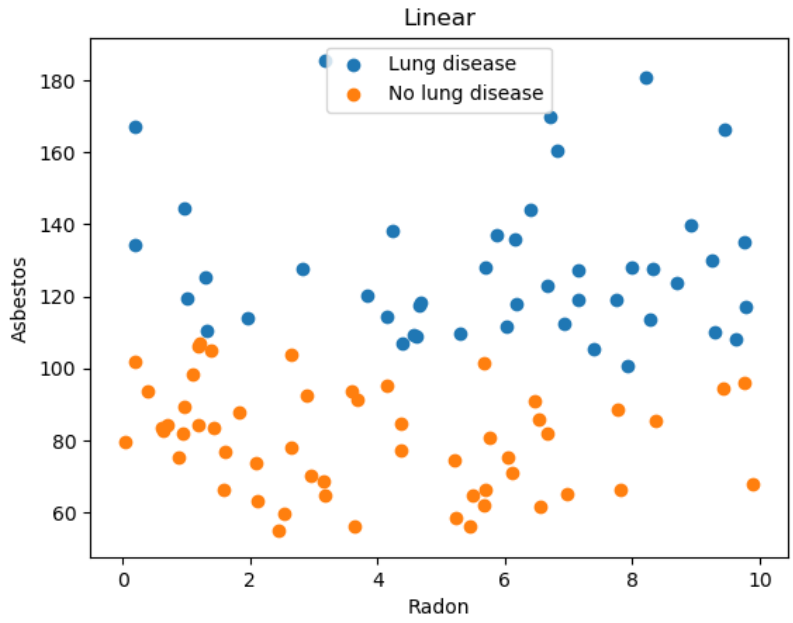
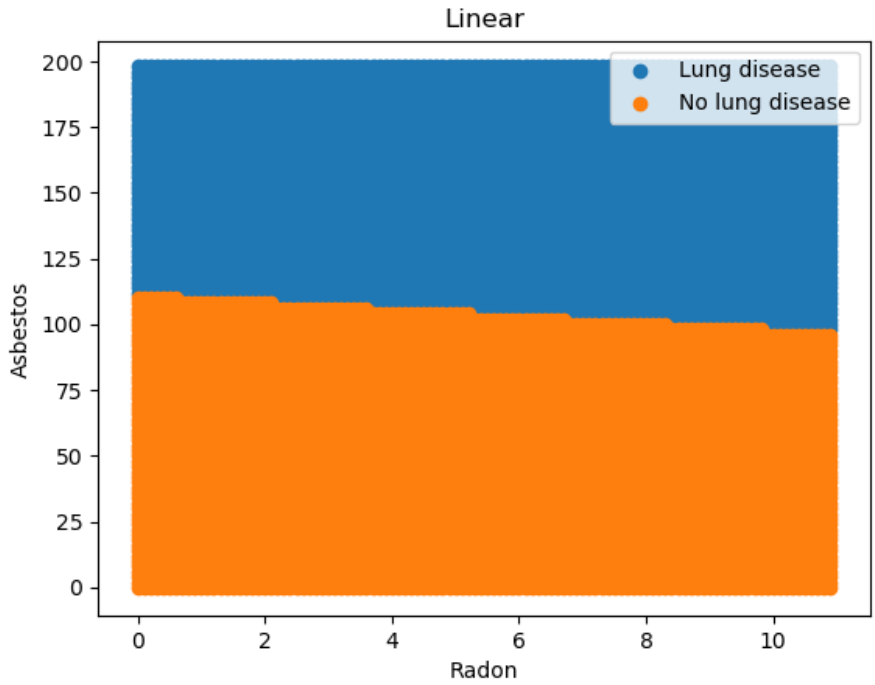
Timothy Goon
4/28/21

Part A



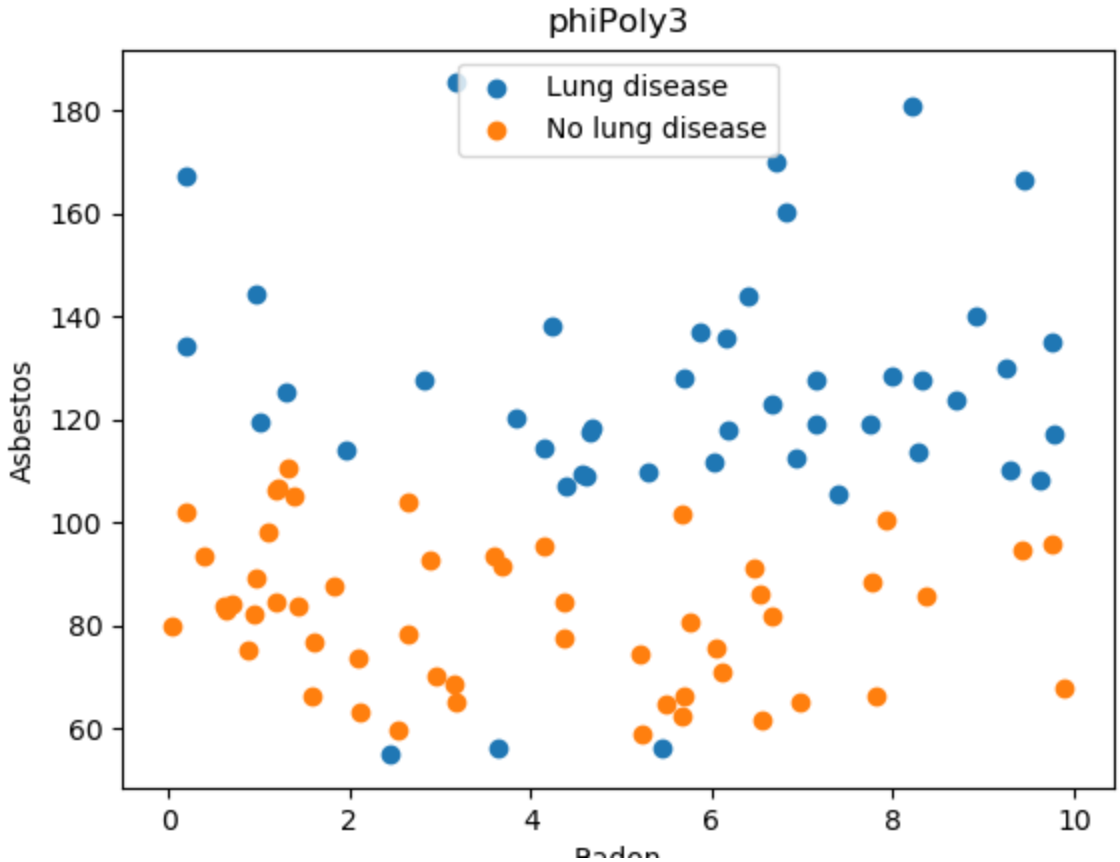


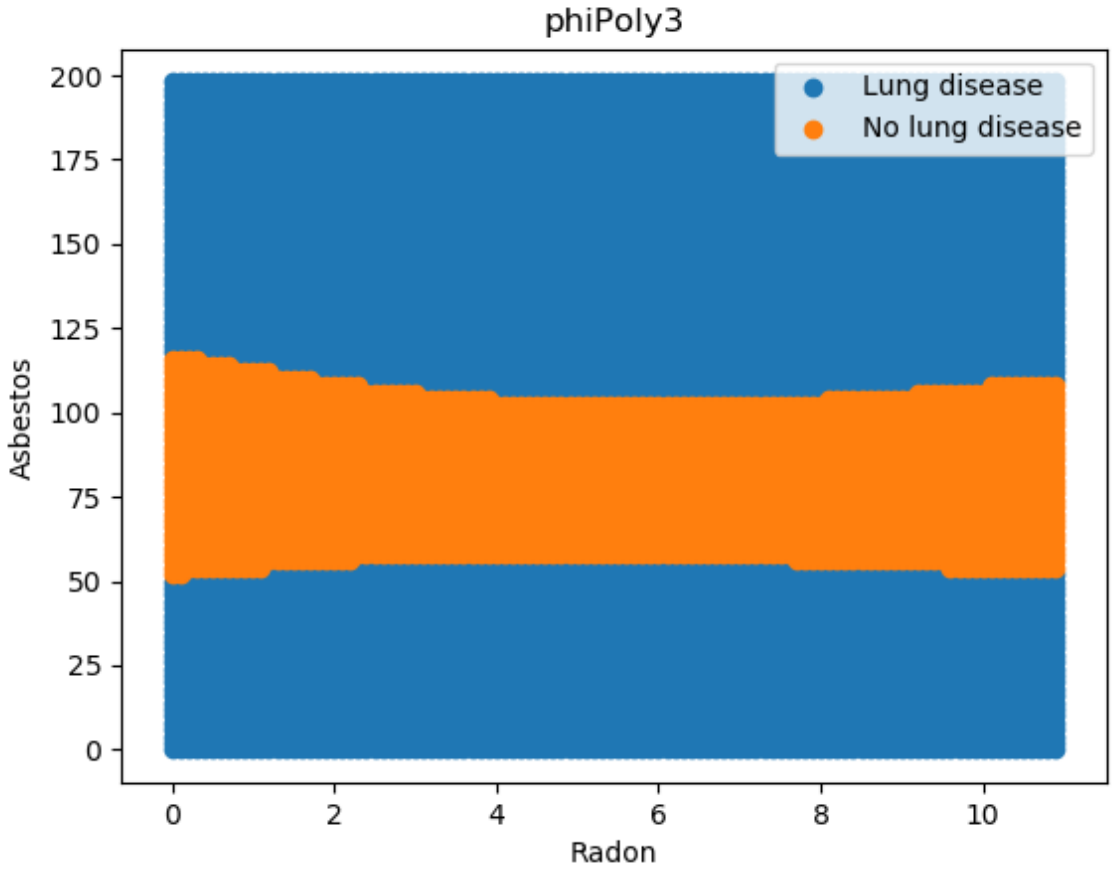
Part B

$\Phi(x) = [$

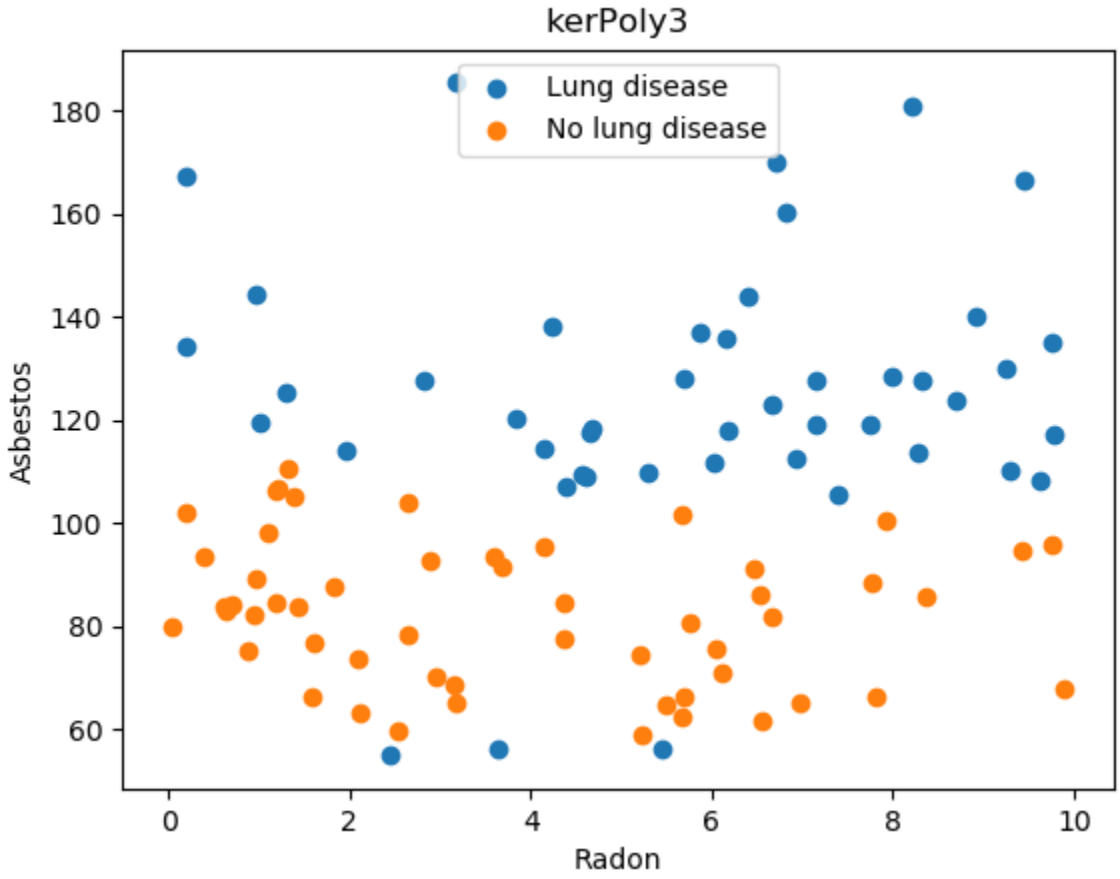
1
$\sqrt{3}y$
$\sqrt{3}y^2$
y^3
$\sqrt{3}x$
$\sqrt{6}xy$
$\sqrt{3}xy^2$
$\sqrt{3}x^2$
$\sqrt{3}x^2y$
x^3

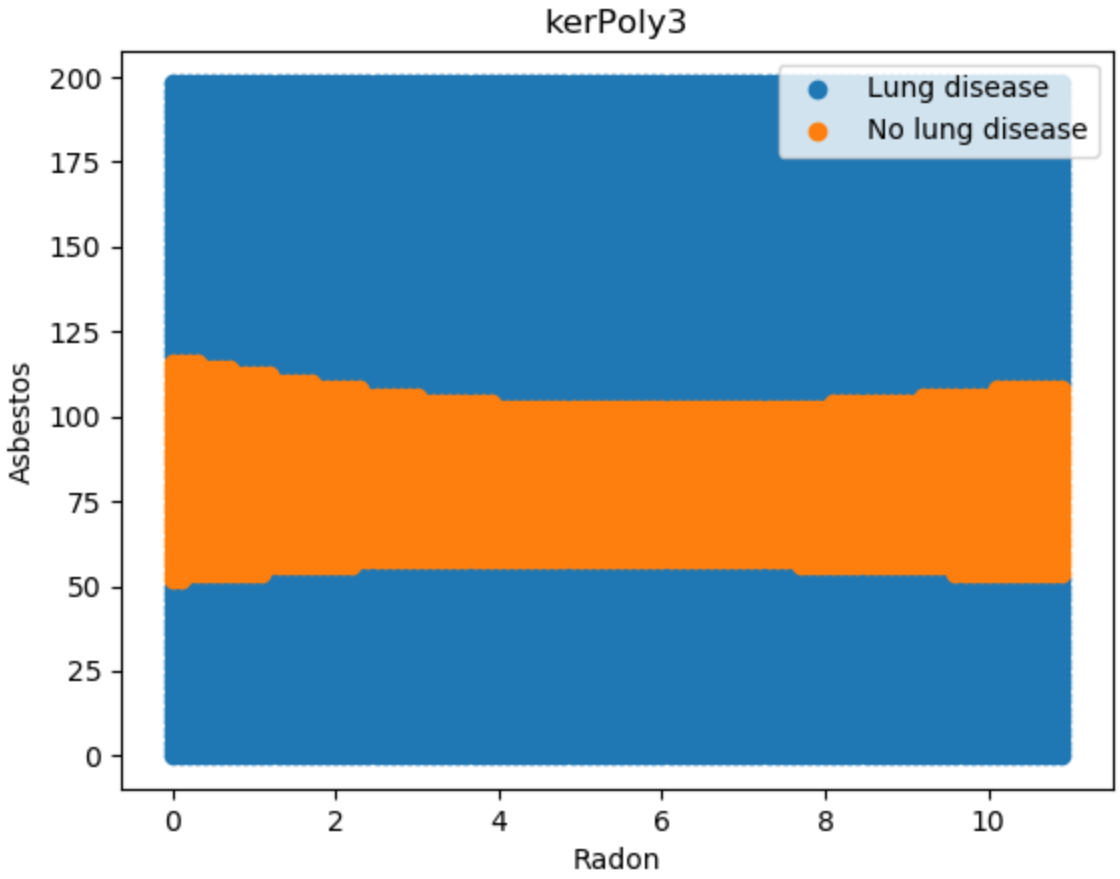
$]$


phiPoly3
Lung disease
No lung disease
Asbestos
180
160
140
120
100
80
60
0
2
4
6
8
10

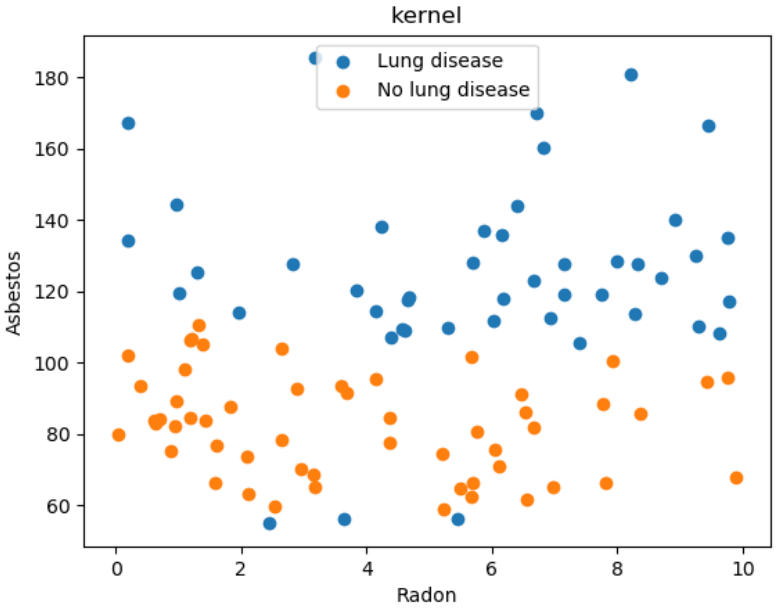

phiPoly3
Lung disease
No lung disease
Asbestos
Radon
200
175
150
125
100
75
50
25
0
0
2
4
6
8
10

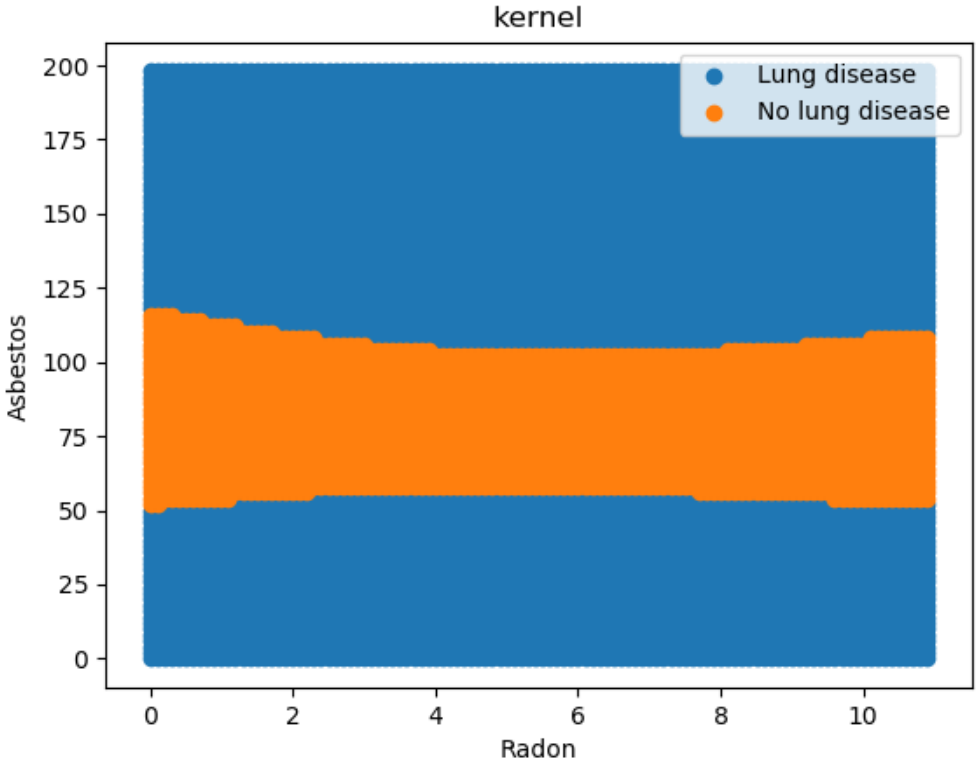
Part C


kerPoly3
Lung disease
No lung disease
Asbestos
Radon
180
160
140
120
100
80
60
0
2
4
6
8
10


kerPoly3
Lung disease
No lung disease
200
175
150
125
100
75
50
25
0
Asbestos
0
2
4
6
8
10
Radon

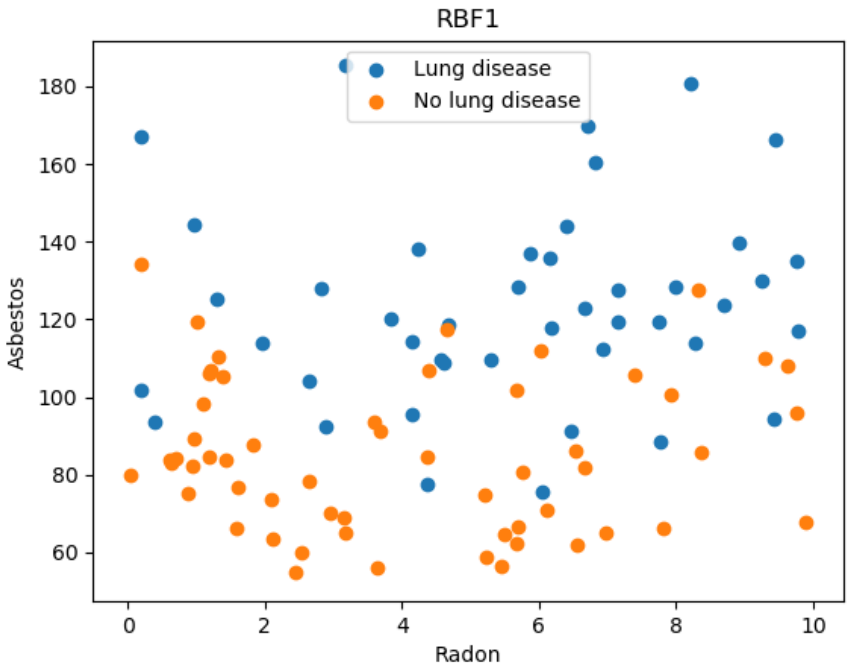
Part D

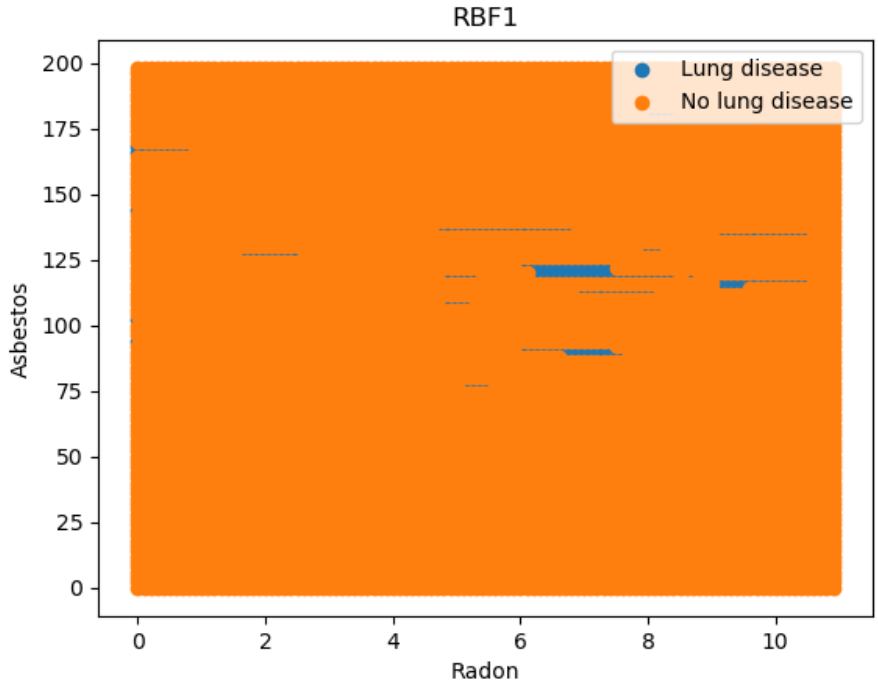

kernel
Lung disease
No lung disease
Asbestos
Radon
180
160
140
120
100
80
60
0
2
4
6
8
10


kernel
Lung disease
No lung disease
Asbestos
Radon
200
175
150
125
100
75
50
25
0
0
2
4
6
8
10

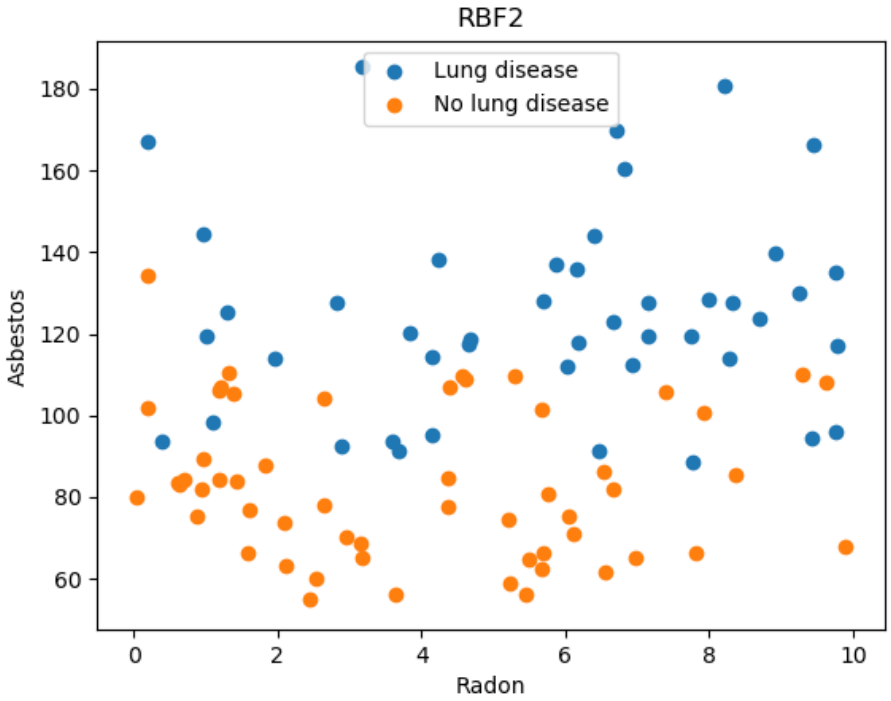
Part E

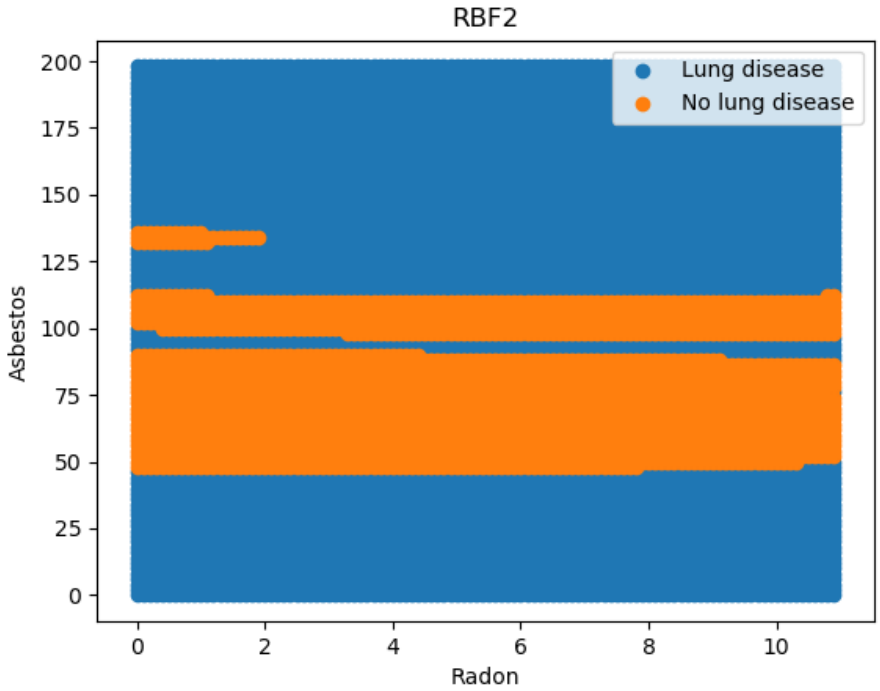
The predictions from the RBF kernel with $\gamma = 1$.





The predictions from the RBF kernel with $\gamma = .03$.





When $\gamma = 1$ the prediction boundaries look like thin strips of blue (lung disease predictions) in a sea of orange (no lung disease predictions). This graph makes it look like it is very hard to get lung disease. When $\gamma = .03$ the prediction boundaries look like large swaths of orange (no lung disease predictions) surrounded by blue (lung disease predictions). It is likely that $\gamma = 1$ causes the model to overfit.