

Peter Smith

PES71

ECE1395

Problem set 7

1B) Accuracy of model is 98.0

The cost with  $\lambda = 0$  : 0.20252633908551312

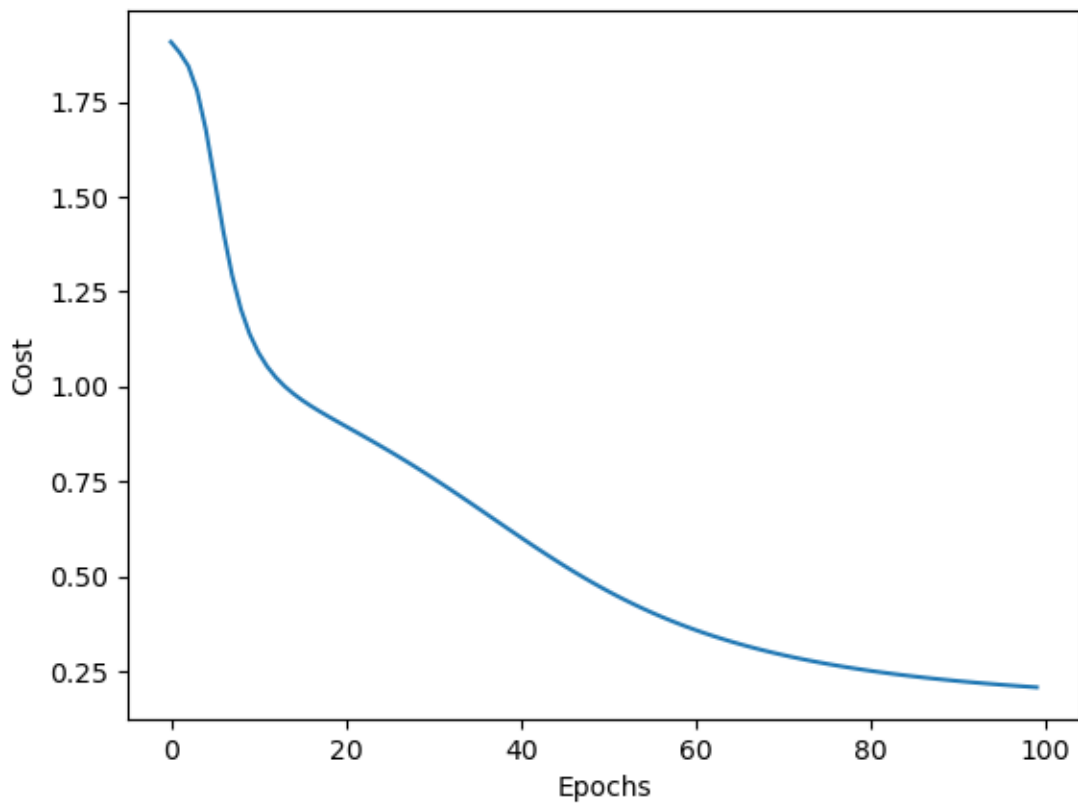
The cost with  $\lambda = 1$  : 1.0326189817073517

2B) The cost with  $\lambda = 2$  : 1.8627116243291904

3) [4.53958077e-05 2.50000000e-01 4.53958077e-05]

4D)  $\alpha = 0.015$

4E)



5)

	MaxEpochs = 50				MaxEpochs = 100			
	Training data accuracy	Training data cost	Testing data accuracy	Testing data cost	Training data accuracy	Training data cost	Testing data accuracy	Testing data cost
$\lambda = 0$	96.1	0.49	100	0.44	96.1	0.22	95.45	0.18
$\lambda = 0.01$	96.1	0.81	100	0.92	93.75	0.57	100	0.47
$\lambda = 0.1$	69.53	1.33	54.54	1.42	68.75	1.32	54.55	1.42
$\lambda = 1$	35.16	1.87	22.73	1.95	35.15	1.87	22.73	2.01

When using a  $\lambda$  value of 0.01 is when I get the best results. I also get a lower cost on the higher Epochs with the lower  $\lambda$  values. When  $\lambda$  gets too high the accuracy drops dramatically and the cost rises greatly. When  $\lambda = 0$  I get good results, but I believe with slight regularization I get the best values.