

Intro to ML  
PS6 Report

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Questions:

- 0) X\_train\_1 size: (40, 4)  
X\_train\_2 size: (42, 4)  
X\_train\_3 size: (43, 4)

1) .

a. .

Mean	Feature 1	Feature 2	Feature 3	Feature 4
Class 1	-0.96	0.90	-1.28	-1.23
Class 2	0.020	-0.71	0.25	0.14
Class 3	0.92	-0.16	1.03	1.09

Standard Deviation	Feature 1	Feature 2	Feature 3	Feature 4
Class 1	0.38	0.88	0.090	0.14
Class 2	0.59	0.70	0.26	0.24
Class 3	0.77	0.77	0.31	0.38

b. 92% accuracy

2) .

- a. Sigma\_1 size: (4, 4)  
Sigma\_2 size: (4, 4)  
Sigma\_3 size: (4, 4)

```
(4, 4)
[[0.1458284 0.26818473 0.00325823 0.01093794]
 [0.26818473 0.79090889 0.01216345 0.03357229]
 [0.00325823 0.01216345 0.00829186 0.0035682 ]
 [0.01093794 0.03357229 0.0035682 0.02020147]]
(4, 4)
[[0.35076435 0.21090408 0.12086883 0.07852627]
 [0.21090408 0.50387511 0.0974818 0.10099519]
 [0.12086883 0.0974818 0.07145612 0.04965294]
 [0.07852627 0.10099519 0.04965294 0.05658212]]
(4, 4)
[[0.6009872 0.27536213 0.21410379 0.08415526]
 [0.27536213 0.60302621 0.09624368 0.15322974]
 [0.21410379 0.09624368 0.10130068 0.03788715]
 [0.08415526 0.15322974 0.03788715 0.1446873 ]]
```

b. All mean vector size: (4,)

```
(4,)  
[-0.95503645  0.90088791 -1.28335256 -1.23561636]  
(4,)  
[ 0.01955215 -0.71057179  0.25173138  0.1414382 ]  
(4,)  
[ 0.922201  -0.16355204  1.03422804  1.09007893]
```

c. Accuracy: 96%

The MLE based classifier performed slightly stronger at 96% percent vs the 92% of the naïve classifier. This could be because of the naïve classifier looking at features as independent. In this case, a couple of the features may be dependent on one another which could lead to misestimation on certain test instances.