

3(a)

```
stat = readtable("UCLA_EE_grad_2030.csv")
```

```
stat = 100×3 table
```

	Var1	Var2	Var3
1	1.3464	1.0473	-1
2	1.3085	2.9918	-1
3	1.4178	1.7215	-1
4	2.9011	1.9453	-1
5	2.7780	2.1079	-1
6	0.8346	0.8468	-1
7	2.0923	1.2631	-1
8	2.2634	1.6337	-1
9	1.2915	1.5779	-1
10	3.2171	1.6040	-1
11	2.9454	1.6665	-1
12	2.1562	1.4961	-1
13	1.2047	2.1377	-1
14	1.2483	1.1196	-1
15	1.3581	2.1177	-1
16	1.6604	1.7785	-1
17	3.4949	2.8804	-1
18	2.2372	1.3643	-1
19	0.9881	1.6919	-1
20	1.1215	2.3977	-1
21	2.4985	2.2647	-1
22	2.2993	2.1265	-1
23	2.9325	3.0100	1
24	2.0004	0.9922	-1
25	3.9899	3.4262	1
26	1.8067	2.4230	-1
27	1.2640	2.6212	-1
28	3.1726	3.4671	1
29	2.6473	3.3963	1
30	1.2791	2.4899	-1

	Var1	Var2	Var3
31	1.0852	1.4113	-1
32	1.2993	1.3271	-1
33	3.0292	1.5742	1
34	2.2966	2.6220	-1
35	2.9682	2.2007	1
36	2.1938	3.0208	-1
37	0.9650	1.6189	-1
38	2.7975	3.4233	1
39	2.3345	1.7328	-1
40	1.7795	1.5407	-1
41	2.8943	1.7052	-1
42	3.8720	3.5305	1
43	3.7586	2.3412	1
44	2.8395	2.5593	1
45	2.8320	1.1192	-1
46	0.8999	1.1622	-1
47	1.2296	2.1092	-1
48	1.4916	2.2715	-1
49	1.6322	2.2857	-1
50	2.2560	3.6656	1
51	1.7122	2.0352	-1
52	2.2988	1.2024	-1
53	0.9677	2.2466	-1
54	1.0093	1.2981	-1
55	1.7391	2.1000	-1
56	3.5045	3.4923	1
57	1.5087	3.9937	-1
58	3.1475	3.5986	1
59	3.4733	2.5357	1
60	2.0705	2.9459	-1
61	3.4373	3.4471	1
62	1.1228	1.2297	-1
63	1.7388	2.5740	-1
64	2.7685	1.9442	-1

	Var1	Var2	Var3
65	1.5444	0.1039	-1
66	2.9483	3.0585	1
67	1.8231	2.9303	-1
68	2.8606	3.7553	1
69	0.4016	1.8701	-1
70	1.3463	2.9213	-1
71	1.6827	1.4023	-1
72	0.9480	1.1228	-1
73	1.3631	2.4126	-1
74	2.6423	3.3355	-1
75	1.9725	2.7349	-1
76	2.3455	1.9815	-1
77	3.3643	3.3076	-1
78	0.8289	2.1835	-1
79	2.5821	2.3420	-1
80	3.2292	1.5103	1
81	1.9689	2.3076	-1
82	1.7212	2.5780	-1
83	1.5843	2.8889	-1
84	3.6283	3.7876	1
85	1.2258	0.9959	-1
86	1.5295	1.5695	-1
87	1.6878	1.1215	-1
88	2.1088	1.0037	-1
89	2.6880	1.7027	-1
90	1.1900	2.3163	-1
91	2.7304	1.3170	-1
92	3.0964	2.1027	-1
93	1.9794	2.2477	-1
94	2.3182	2.7593	-1
95	2.6031	2.5020	-1
96	1.3902	1.6126	-1
97	2.2974	1.9573	-1
98	2.3222	1.9898	1

	Var1	Var2	Var3
99	3.6230	2.3692	1
100	3.7062	1.9787	-1

```
x = stat{:,1:2};
y = (stat{:,3} + 1) / 2;
N = length(y);
```

```
admit = x(y == 1,:);
rejec = x(y == 0,:);
```

```
P0 = length(rejec) / N;
mu0 = mean(rejec);
mu1 = mean(admit);
mu = [mu0; mu1];
```

```
P0
```

```
P0 = 0.7900
```

```
mu0
```

```
mu0 = 1x2
    1.8678    1.9673
```

```
mu1
```

```
mu1 = 1x2
    3.1637    2.9590
```

```
covar = zeros(2, 2);
for i = 1:N
    covar = covar + (x(i,:) - mu(y(i) + 1,:))' * (x(i,:) - mu(y(i) + 1,:));
end
covar = covar / N;

covar
```

```
covar = 2x2
    0.4457    0.0731
    0.0731    0.4745
```

```
w = covar \ (mu0' - mu1')
```

```
w = 2x1
   -2.6314
   -1.6845
```

```
b = -0.5 * (mu0 / covar * mu0' - mu1 / covar * mu1') + log(P0) - log(1 - P0)
```

```
b = 12.0941
```

```
xval = 0:0.1:4;
```

```

yval = 0:0.1:4;
figure(1);
hold on;
plot(xval, -1 / w(2) * (w(1) * xval + b));
ylim([0 4.5]);
scatter(admit(:,1), admit(:,2), 'blue');
scatter(rejec(:,1), rejec(:,2), 'red');
title('GDA Decision Boundary for 2030');
xlabel('GPA');
ylabel('GRE');

```



(c)

```

M = length(xval);
[GPA, GRE] = meshgrid(xval, yval);

Z0 = zeros(M);
Z1 = zeros(M);
for i = 1:M
    for j = 1:M
        k = [GPA(i, j); GRE(i, j)];
        Z0(i, j) = P0 * mvnpdf(k, mu0', covar);
        Z1(i, j) = (1 - P0) * mvnpdf(k, mu1', covar);
    end
end

figure(2);
hold on;

```

```

scatter(admit(:,1), admit(:,2), 'blue');
scatter(rejec(:,1), rejec(:,2), 'red');
plot(xval, -1 / w(2) * (w(1) * xval + b), 'red');
contour(GPA, GRE, Z0, 'LevelList', logspace(-2, -0.6, 7));
contour(GPA, GRE, Z1, 'LevelList', logspace(-2, -0.6, 7));
ylim([0 4.5]);

title('Countour Map for Admitted and Rejected Data');
xlabel('GPA');
ylabel('GRE');

```

