Math 168 Homework 7

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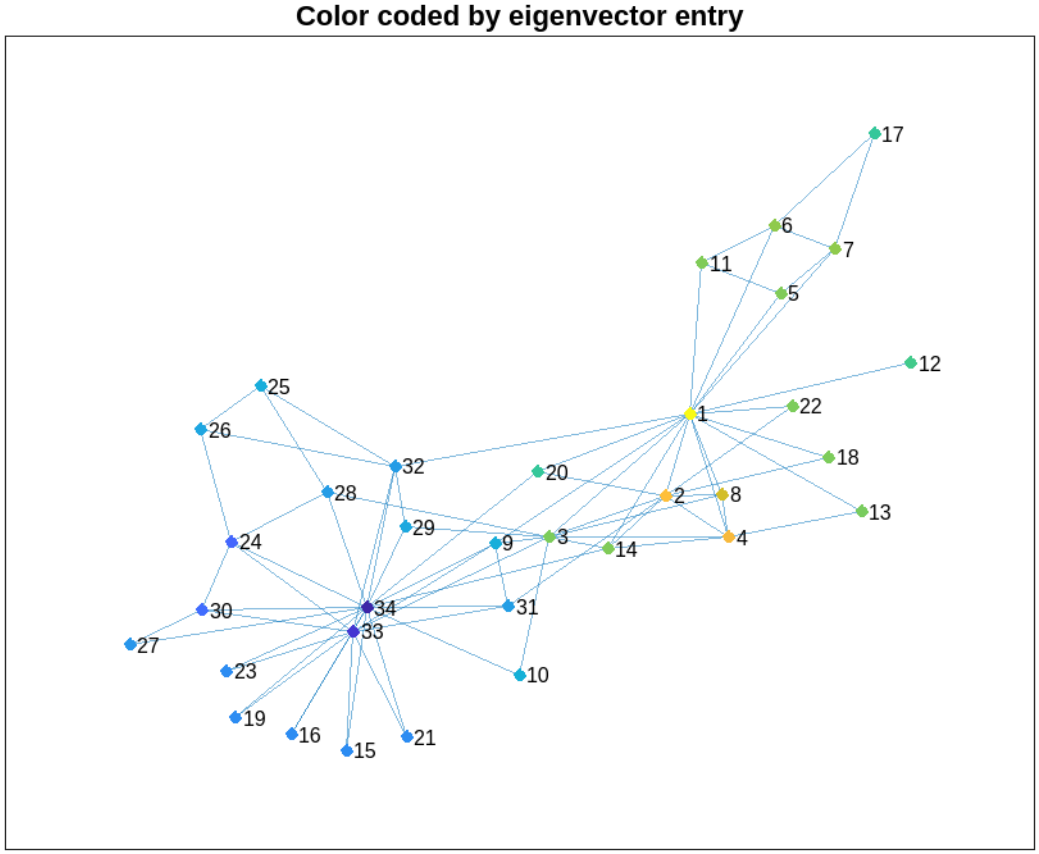
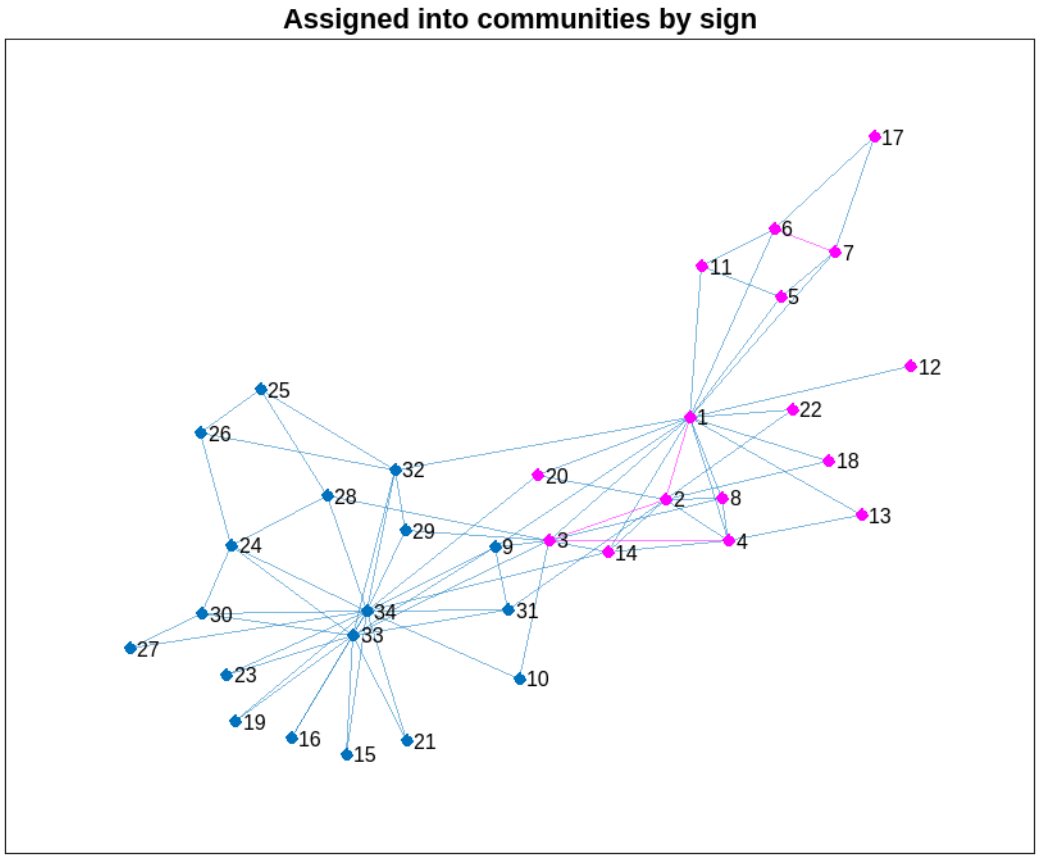
Exercise 1

(a) The network represents friendships at a karate club. The reason why it is interesting and important is because its members are almost perfectly split into two factions, and it illustrates the power of the community detection algorithm since the algorithm only incorrectly assigns one member.

(b) Graphs





(c) Output:

```
Number of clusters: 1, modularity: -0.000000
Number of clusters: 2, modularity: 0.313281
Number of clusters: 3, modularity: 0.399080
Number of clusters: 4, modularity: 0.419790
Number of clusters: 8, modularity: 0.282873
```

It seems that the modularity is maximized at 4 clusters.

Midterm corrections

1a.

$$g_0'(z) = p(1) + p(2)z + p(3)z^2 + \cdots$$
$$g_0'(z) = 1 + \frac{1}{2-z}$$
$$g_0'(1) = p(1) = \boxed{3/2}$$

3c.

$$\frac{24(c-1)}{c/2-1}$$