1. a. Is ego's network composed of strong ties, or weak ties, or both? In other words, are there many closed triads and reciprocal follower/friend relationships, or many one-way follower relationships between ego and alters but few relationships between the alters themselves? This could be an indication of whether the user is a regular person, with some or many closed triads, or a business or group, with few or no closed triads.

b. What clusters are present? This can show if the user has distinct subgroups within their alters, such as friends, family, and professional connections. It may be the case that the user would like to establish lists for each of these groups to enable targeting of tweets rather than broadcasting each tweet to all followers en masse.

c. Are there any members of the network that are especially important in bridging between subgroups? This would be measured with betweenness centrality, and would be useful in understanding how some users are critical to intergroup communication.

2. I used the network information for vlad43210. While I have a Twitter account, I have never used it. So, it's vlad43210 for me. (My whitelist request was rejected by Twitter, by the way).

Following the examples in the book, I decided to explore the triadic closure properties of the network. To this end, I downloaded vlad43210's network information by following the instructions in the book and created the initial network diagram in Figure 1. This show the raw edges in the network, with no filtering applied.

![Figure 1](image)

The nodes along the outer ring are, for the most part, unconnected to anyone but vlad43210 in the network. They are followers of his, and they do not know each other, so they do not form part of a close social network; rather, they are connected to vlad43210 by a single weak tie. To examine only those nodes involved in stronger relationships, we can filter the network to only
show users who are connected to at least two other people, or who have reciprocal relationships with vlad43210. Again following the procedure in the textbook, I calculated in- and out-degree for each vertex, then created a new column "sum degree" and set it to be the sum of the in and out degrees for each user. I then filtered the graph view to only display nodes whose sum degree was greater than 1, which effectively removed all of the weakly-connected users from the graph. This produced the network diagram shown in Figure 2.

It seems that the network is roughly divided into two major subgroups, and this impression is verified by running the "find clusters" analysis, which produces the network diagram in Figure 3. There is a cluster of green vertices, and a cluster of blue vertices, plus smaller yellow and pink groups. These likely represent distinct subgroups in his network, such as friends, family and professional contacts.
Finally, we will look at betweenness centrality and eigenvector centrality to find out the importance of people in the network. Using the Graph Metrics tool in the NodeXL analysis section, we can calculate these metrics to vlad43210's 1.5 degree network and use the Autofill Columns feature to map vertex size to betweenness centrality and vertex color to eigenvector centrality. The resulting diagram is shown in Figure 4. We can see that user "eytanadar" has high betweenness and eigenvector centrality degrees in one of vlad43210's two major subgroups, while "not_empty" plays a similar role in the other major subgroup. "grammarnerd" and "cameronbarlow" both have high degrees of eigenvector centrality, meaning they are well connected to other well-connected people.
3. For the Black Friday example, I searched for the term "Black Friday" and retrieved the network of users who mentioned that term. I initially limited my search to the first 100 users, but found that the resulting network was almost entirely unconnected. After a few more tries at 100 users, I changed to 500 users and seemed to get more interesting data. The main question I want to research is this: are there any "stars" who seem important in the dissemination of information related to Black Friday, and if so, how are they connected to others in the network?

I mapped the network data, but first chose not to display any users who have a combined in- and out-degree value of less than 2. This eliminated all those users who merely mentioned "Black Friday" but were not connected to anyone else in the graph. The resulting network diagram Figure 5 shows many connections between single pairs of users who are otherwise unconnected to the rest of the network, and a few users who are connected to multiple other people. We can examine the latter group to see if there are any "stars" in our network. It is simple enough to click on the vertices representing people who are connected to two or more other people in the network (the corners of triangles or larger shapes) and to examine the contents of their tweets; this reveals that the majority of such people are using the term "Black Friday" merely as a signifier of the day following Thanksgiving, not as a reference to the retail sales events on that day. Typical examples include:

"Black Friday Da Cyph's 5Yr Anniversary @ BB Kings W/ Hot 97's DJ Enuff !"
"#RumbleInTheLo drops Black Friday Nov 26th #Buffalo"
"THE OFFICIAL TRAILER FOR "THE UNTOUCHABLES" http://www.twitvid.com/6YFJC DROPPING BLACK FRIDAY"

The following example shows a use of the term in reference to sales, but not actual sales at a specific store:

"Sooo it's officially November. The month packed with great food, Black Friday sales & @TesxEmarco mixtape #ThanksForGiving! Stay tuned! #VVE"

It seems clear from this data that the network I retrieved did not contain information about any "stars" as discussed in the book. The users in my network are not active producers or consumers of data about Black Friday sales. This is likely due to the limited amount of data I was able to
retrieve using the Twitter API; it may be that trends similar to those observed in the book would be apparent if I had access to a larger data set, and it could also be that a different data set would reveal different results.

4. A Twitter conversation has analogs to features found in “real life” conversations, which are made clear by the use of various syntactic notations in Twitter messages. Specifically:

a. @replies are used to signify that a message is intended for a particular recipient. This is analogous to saying, “John, check this out…” to a group of people including John, rather than just saying, “Check this out…” to the group as a whole. The group can see that you are addressing John, but they are still privy to the contents of the conversation.

@mentions provide a mechanism by which you can merely mention someone in conversation, but not address them directly. This is simply a way to refer to another Twitter user. This is analogous to saying, “I was talking to John, and …”

b. hashtags are a mechanism by which users can refer to a common event or idea by including a term that has been adopted for that purpose. For instance, including the hashtag “#sandiegofire” creates a new kind of group (if it doesn’t already exist) outside the friend/follower dynamic, whereby users can search for the hashtag and see related tweets, whether tweeted by their friends or not.

c. retweeting is analogous to saying, “John told me that …” in a real conversation. It is passing on a message, with attribution to the person who told you.

d. Twitter friend and follower relationships reflect to some degree the relationships we have in real life. If two people are friends and followers of each other on Twitter, their relationship is closer than one in which the tie is one-way. Closely-tied people are more likely to be friends or related in real life, whereas people with one-way ties may not even know each other, as in the case of a celebrity who has thousands or millions of followers. These people are not friends; they merely want to know what the celebrity is doing, while the celebrity (probably) has no interest in what their followers are doing.

e. Twitter provides mechanisms for gossip propagation, including the ability to refer to other people (with @mentions), to send directed messages (with @replies), to say what people are saying about each other (with retweeting), and to reference common interests (such as celebrities, with hashtags).