

Part 1

1. 18.26.0.122
2. it produces an alias for hostname - mercury.lcs.mit.edu
3. according to its time to live (TTL)
4. dig +domain=mit.edu ai: no IP, authority section points to ai.mit.edu.; dig +domain=mit.edu ai.: IP = 209.59.119.34.
5. +domain parameter searches the list that contains the single domain. With a dot after domain name, it is absolute, whereas without a dot is relative. Thus dig +domain=mit.edu ai. points to the authority server mit.edu ai. to answer query.
6. dig lirone.csail.mit.edu +trace +norecurse
7. IP: 128.52.129.186
 - dig @l.root-servers.net. lirone.csail.mit.edu +norecurse
 - dig @a.edu-servers.net. lirone.csail.mit.edu +norecurse
 - dig @usw2.akam.net. lirone.csail.mit.edu +norecurse
 - shows IP = 128.52.129.186
8.
 - command: dig @192.168.2.100 www.d.org +norecurse
 - no, since it does not have an answer
 - query time: 17msec
10. query time: 5msec, DNS server has served its purpose since it takes a shorter time to translate the internet names to IP address

Part 2

1. UDP
2. source port: 53; destination port: 53
3. 192.168.81.41. no, the 2 addresses are not the same.
4. recursive query. no answers.
5. 2 answers provided. Answers contain: name, type, class, time to live, data length, and (CNAME/Address).
6. yes, the source IP is 192.168.81.41, corresponds to IP address to which DNS query message was sent.