Question 1

1. The IP address of www.koala.com.au is 172.67.219.46 and 104.21.45.210. It has multiple IP addresses because it has multiple servers to run the same website, use a technique called round-robin DNS to achieve load distribution and load balancing.
2. localhost. 127.0.0.1 is the first assignable IP adddress in the subnet, and it is always used to establish connection with the same machine being used by the end-user.

Question 2

Unreachable address:

- www.getfittest.com.au
- www.hola.hp

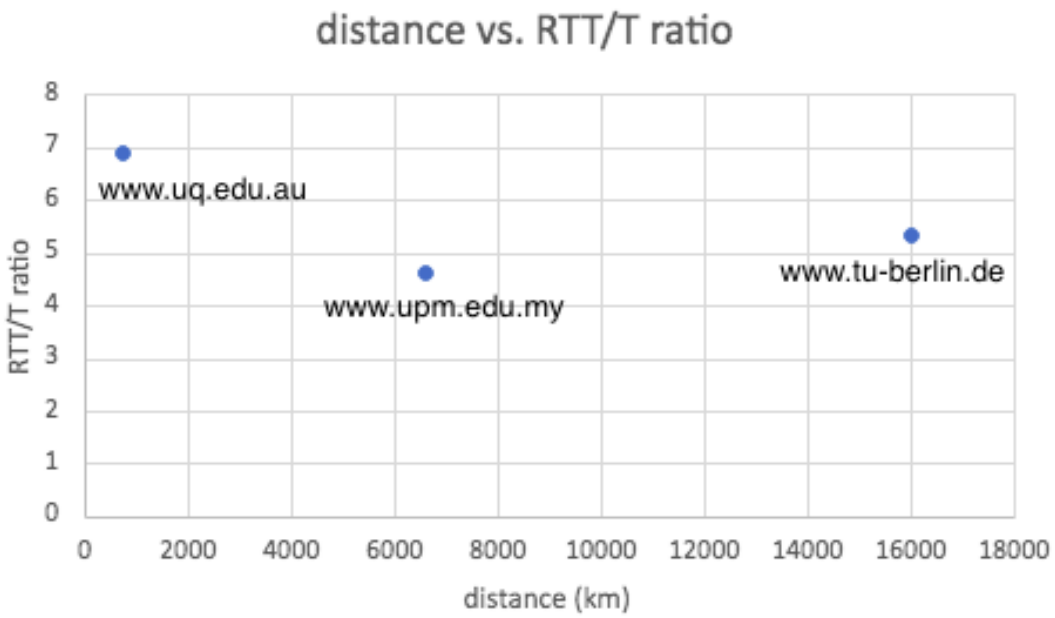
www.getfittest.com and www.hola.com exist, however they are not in domain “au” and “hp”. We try to find them in the wrong domain, therefore they are not reachable.

Question 3

1. 22 routers between my workstation and www.columbia.edu, 5 of them are part of UNSW network, between 113.197.15.201(AU) and 207.231.240.8(Seattle, US), the packets cross the pacific ocean.
2. After 149.171.253.34, the three paths diverge. This router is Asia Pacific Network Information Centre, at South Brisbane. The number of hops on each path is proportional the physical distance.
3. I choose www.speedtest.com.sg and www.telstra.net. The reverse path doesn’t go through the same routers as forward path. This is each router takes its own decision about the next-hop and doesn't care about the path another packet in the same conversion took.

Question 4

1. Let T be the time for light to travel the certain distance.
    - www.uq.edu.au is approximately 740km from UNSW
        - T = 7.4*10^5 /(3*10^8) = 2.5ms
        - RTT = 17.3ms
        - Ratio = 6.9
    - www.upm.edu.my is approximately 6600km from UNSW
        - T = 6.6*10^6 /(3*10^8) = 22ms
        - RTT = 102ms
        - Ratio = 102/22 = 4.6
    - www.tu-berlin.de is approximately 16000km from UNSW
        - T = 1.6*10^7 /(3*10^8) = 53ms
        - RTT = 281ms
        - Ratio = 281/53 = 5.3



Possible reasons that y-axis is greater than 2:

- The RTT is at least 2T since the packets needs to reach the destination from UNSW and get back
- There are 4 types of delays, transmission delay, quening delay propagation delay and processing delay, and T only account for propagation delay.
- Therefore RTT is more than 2 times larger than T, hence the ratios are all greater than 2.

2. It slightly varys over time. One possible reason is uncertainty in quening delay. The router can process one packet at a time. When the package arrival at the router, there could be some packets waiting in queue to be transmitted, or the queue could be empty, depend on if there are other hosts or routers send packet to the current router our packet in. Therefore the total delay is randomly varying overtime.
3. It is NOT in Switzerland, it's in San Francisco.
4. Transmission delay is time that a packet takes to be placed in the link, therefore it depends on the size of the packet. All the other delays are irrelevent to the packet size.