1. A URL search would require DNS (and UDP for name resolution), however if the IP is already known (and entered instead), this may be mitigated. HTTP would require TCP for the server connection. TCP and UDP both would be needed at the transport layer.

2a. 𝑅𝑇𝑇1 + 𝑅𝑇𝑇2 + ⋯ + 𝑅𝑇𝑇𝑁 + 𝑇𝑖

2b. 1.5𝑅𝑇𝑇𝑠 + 𝑅𝑇𝑇1 + 𝑅𝑇𝑇2 + ⋯ + 𝑅𝑇𝑇𝑁 + 𝑇𝑖

3a. 18𝑅𝑇𝑇𝑠 + 𝑅𝑇𝑇1 + 𝑅𝑇𝑇2 + ⋯ + 𝑅𝑇𝑇𝑁

3b. 6𝑅𝑇𝑇𝑠 + 𝑅𝑇𝑇1 + 𝑅𝑇𝑇2 + ⋯ + 𝑅𝑇𝑇𝑁

3c. 3𝑅𝑇𝑇𝑠 + 𝑅𝑇𝑇1 + 𝑅𝑇𝑇2 + ⋯ + 𝑅𝑇𝑇𝑁

4a. 5,345.33 seconds + 8𝑇𝑝

4b.5,338.5 seconds + 16𝑇𝑝

4c. Based on the results, there is negligible difference in using persistent vs non-persistent HTTP.

5a. Yes. Tom’s parallel connections allow him more bandwidth and therefore he can access web pages more quickly, as well as avoid opening additional connections for each reference object.

5b. Yes, Tom would still reap the benefit of parallel connections regardless of what others are doing. Comparatively to not having parallel connections, these connections will ensure he has the highest available bandwidth.

6a.2.0 seconds + 0.25 seconds = 2.25 seconds

6b. 1.36 seconds.   
  
With a hit rate of 1/3, the miss miss rate of 2/3 drops traffic, reducing intensity from 0.9 to 0.6 with a new access delay of 41msec. This would result in a total delay of 2.041 seconds for 2/3 of the requests that don’t cache.