Homework

A client sends a 200 byte request message to a service, which produces a response containing 5000 bytes. Estimate the total time to complete the request in each of the following cases, with the performance assumptions listed below:

i) Using connectionless (datagram) communication (for example, UDP);
ii) Using connection-oriented communication (for example, TCP);
iii) The server process is in the same machine as the client.

[
Latency per packet (local or remote, incurred on both send and receive): 5 milliseconds
Connection setup time (TCP only): 10 milliseconds
Data transfer rate: 10 megabits per second
Maximum Transfer Unit (MTU): 1000 bytes
Server request processing time: 2 milliseconds
Assume that the network is lightly loaded, so network delays are ignored.
In the same machine: the messages can be sent by a single in memory copy, where inter-process data transfer rate is at 40 megabits/second.
]

i. Total time =

$$5\times10^{-3}+\frac{200\times8}{10\times10^{6}}+2\times10^{-3}+\frac{5000}{1000}\times\left(5\times10^{-3}+\frac{1000\times8}{10\times10^{6}}\right)=3.616\times10^{-2}s$$

ii. Total time =

$$10\times10^{-3}+5\times10^{-3}+\frac{200\times8}{10\times10^{6}}+2\times10^{-3}+\frac{5000}{1000}\times\left(5\times10^{-3}+\frac{1000\times8}{10\times10^{6}}\right)=4.616\times10^{-2}s$$

iii. Total time =

$$5\times10^{-3}+\frac{200\times8}{40\times10^{6}}+2\times10^{-3}+\frac{5000}{1000}\times\left(5\times10^{-3}+\frac{1000\times8}{40\times10^{6}}\right)=3.304\times10^{-2}s$$