$= \log 2 + (\log 2 + \log 3) + (\log 2 + \log 3) + (\log 2 + \log 3 + \log 5) + (\log 2 + \log 3 + \log 5) \times \frac{1}{2}$

$= 4\cdot 5 \log 2 + 3\cdot 5 \log 3 + 1\cdot 5 \log 5$ ✓ 2.

b) Use the same method as in a).

$\theta_1(x) = \int_1^x \sum_{p \le t} \log p \, dt$

$= \sum_{k=1}^{[x]-1} \int_k^{k+1} \sum_{p \le t} \log p \, dt + \int_{[x]}^{x} \sum_{p \le t} \log p \, dt$ ✓

$= \sum_{k=1}^{[x]-1} \sum_{p \le k} \log p \int_k^{k+1} dt + \sum_{p \le t} \log p \int_{[x]}^{x} dt$ ✓

$= \sum_{k=1}^{[x]-1} \sum_{p \le k} \log p + (x - [x]) \sum_{p \le [x]} \log p$ ✓

$= \sum_{k=1}^{[x]-1} \sum_{p \le k} \Lambda_1(n) + (x - [x]) \sum_{p \le [x]} \Lambda_1(n)$ what is n and what happened to p?

$= \sum_{p \le 1} \Lambda_1(n) + \sum_{p \le 2} \Lambda_1(n) + \dots \sum_{p \le [x]-1} \Lambda_1(n)$

$+ (x - [x]) \sum_{n \le [x]} \Lambda_1(n)$

This is not rigorous - you need to manipulate the general term.

PTO.

$= \Lambda_1(1) + \Lambda_1(1) + \Lambda_1(2) + \Lambda_1(1) + \Lambda_1(2) + \Lambda_1(3) + \dots$
$+ \Lambda_1(1) + \Lambda_1(2) + \Lambda_1(3) + \dots + \Lambda_1([x]-1) + \dots$
$+ (x-[x])\Lambda_1(1) + (x-[x])\Lambda_1(2) + (x-[x])\Lambda_1(3)$
$+ \dots + (x-[x])\Lambda_1([x])$

$= (x-1)\Lambda_1(1) + (x-2)\Lambda_1(2) + \dots + (x-n)\Lambda_1(n)$
$+ \dots + (x-[x])\Lambda_1([x])$