Question 1:

To produce an equation which computes from only , starting from (2):

We also have:

By substitute (4) into (3), we have:

Which is the result that we look for.

Question 2:

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| --- |
| lcVariance :: [Float] -> Float  lcVariance [] = undefined  lcVariance [x] = 0  lcVariance (x:xs) = (1/nplus1) \* (x^2 + n \* (lcVariance xs + avg xs ^2)) - avg (x:xs) ^2      where          avg :: [Float] -> Float          avg ys = sum ys / fromIntegral(length ys)          nplus1 :: Float          nplus1 = fromIntegral(length (x:xs))          n :: Float          n = fromIntegral(length xs) |

Question 3:

|  |
| --- |
| trVariance :: Float -> Float -> Float -> [Float] -> Float  trVariance \_ \_ \_ [] = undefined  trVariance \_ \_ variance [x] = variance  trVariance n avgfull variance (x:xs) = trVariance (n+1) avgnew ((1/(n+1)) \* (x^2 + n \* (variance + avgfull ^2)) - avgnew ^2) xs      where          avgnew :: Float          avgnew = (x+n\*avgfull)/(n+1) |

Question 4:

|  |
| --- |
| variance :: [Float] -> Float  variance = trVariance 1 0 0 |