1. CHECK YOUR UNDERSTANDING

At the end of a smartphone SoC development project, the chip is found to exceed the target size by 10%, requiring the design team to determine which features to remove to reduce the chip size.

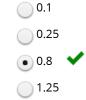
1 A. CHECK YOUR UNDERSTANDING (1/1 point)

A team member determines that removing another team member's feature (rather than one of their own features, of

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What is the performance of the smaller chip without the feature relative to the performance of the current chip design?

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EXPLANATION

The relative performance can be determined by the ratio of the execution time of the chip with the feature included to the execution time without the feature, or 8/10 = 0.8.

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1 B. CHECK YOUR UNDERSTANDING (1/1 point)

The other team member strikes back, recalling that the first team member's enhancement to integer divide instructions only affected 1 second out of the original execution time of the program without the enhancement (which neither of them can recall). Moreover, removing that enhancement would reduce the chip size even more than removing their feature. However, the first team member argues that their enhancement improved those integer divide instructions by a factor of 10.

What was the execution time of the original program before the inclusion of the integer divide enhancement (**rounded to the nearest integer**)?



EXPLANATION

We first apply Amdahl's Law to determine the execution time that was unaffected by the enhancement:

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Execution Time_{enhanced} = (Execution Time affected / Amount of improvement) + Execution Time unaffected

8 = 1/10 + Execution Time unaffected

Execution Time unaffected = 7.9 seconds

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Now, if the enhancement were not included, there would be no improvement to the 1 second of execution time involving integer divide instructions.

Therefore, the execution time of the original program was 7.9 + 1 = 8.9 seconds. It would be better to remove the integer divide instruction enhancement.

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