Missouri University of Science & Technology	Department of Computer Science
Fall 2023	**CS 5408: Game Theory for Computing**

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Homework 3: Coalitional Games

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Instructor: *Sid Nadendla*   **Due:** *October 23, 2024*

Consider an electoral college with four parties A, B, C, and D with 45, 25, 15, and 15 representatives respectively, which can form coalitions to form a simple-majority government (at least 51 votes) and obtain control over a \$1 trillion budget. Assuming that the value of the winning coalition is

$$v(C) = \begin{cases} 10^{12}, & \text{if } |C| \geq 51, \\ \\ 0, & \text{otherwise,} \end{cases}$$

Problem 1   Fair Distribution   *9 pts.*

Find the Shapley value to fairly divide the total budget amongst all parties.

Problem 2   Coalition Stability   *9 pts.*

Find the core, i.e. the set of all stable coalitions, in the above game.