Missouri University of Science & Technology — Department of Computer Science
Fall 2021 — **CS 5408: Game Theory for Computing**

Homework 5: Coalitional Games

Instructor: *Sid Nadendla* — **Due:** *November 22, 2021*

Problem 1 Coalitional Governments *20 pts.*

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

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

(a) Find the Shapley value to fairly divide the total budget amongst all parties? [10 points]

(b) Find the set of all stable coalitions (Core) in the above game. [10 points]