

# Math 36

## Homework 11

### Game Theory: Multiplayer Cooperative Games

1. Consider the three-player game with payoff matrix:

$P_1 : 1$	$P_3 : 1$	$P_3 : 2$	$P_1 : 2$	$P_3 : 1$	$P_3 : 2$
$P_2 : 1$	( 1,3,1 )	(2,1,1)	$P_2 : 1$	( 2,0,0 )	(3,1,1)
$P_2 : 2$	(4,2,3)	(3,0,0)	$P_2 : 2$	(0,0,1)	(0,1,1)

Find the values of  $V(P_1)$  and  $V(P_1, P_2)$ .

2. For a different game with coalition value function:

$$\begin{aligned} V(\emptyset) &= 0 & V(N) &= 100 \\ V(P_1) &= 10 & V(P_2) &= 8 & V(P_3) &= 12 \\ V(P_1, P_2) &= 40 & V(P_1, P_3) &= 80 & V(P_2, P_3) &= 60 \end{aligned}$$

determine the payoff vector given by the Shapley function  $\varphi$ .