Data605-Week4-Discussion4-Kamath

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C10† In the vector space $\mathbb{C}^3$, compute the vector representation $\rho_B(\mathbf{v})$ for the basis B and vector $\mathbf{v}$ below.

$$B = \left\{ \begin{bmatrix} 2 \\ -2 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix}, \begin{bmatrix} 3 \\ 5 \\ 2 \end{bmatrix} \right\} \qquad \mathbf{v} = \begin{bmatrix} 11 \\ 5 \\ 8 \end{bmatrix}$$

Figure 1: Exercise- Representations- C10

```
#defining the matrix B and v:
B <- matrix(c(2, -2, 2, 1, 3, 1, 3, 5, 2), 3, 3)
B
```

```
##      [,1] [,2] [,3]
## [1,]    2    1    3
## [2,]   -2    3    5
## [3,]    2    1    2
```

```
v <- matrix(c(11, 5, 8), 3, 1)
v
```

```
##      [,1]
## [1,]   11
## [2,]    5
## [3,]    8
```

```
# With augmented matrix we have as below:
A <- matrix(c(2, -2, 2, 1, 3, 1, 3, 5, 2, 11, 5, 8), 3, 4)
A
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    2    1    3   11
## [2,]   -2    3    5    5
## [3,]    2    1    2    8
```

```r
Arref <- pracma::rref(A)
Arref
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0    0    2
## [2,]    0    1    0   -2
## [3,]    0    0    1    3
```

```r
pB.v <- matrix(Arref[,4 ], 3, 1)
pB.v
```

```
##      [,1]
## [1,]    2
## [2,]   -2
## [3,]    3
```
