Linear Algebra — Class Exercise 15

Vectors in $\mathbb{R}^2$ and $\mathbb{R}^3$

1. For $A(-1, 2, 5)$ and $B(4, -3, 1)$, find $\overrightarrow{AB}$, $\overrightarrow{BA}$ and the distance from A to B.

2. For $\mathbf{u} = (2, -1, 3)$ and $\mathbf{v} = (4, 1, -5)$, find $3\mathbf{u} - 2\mathbf{v}$, $\|\mathbf{u} + \mathbf{v}\|$, and the vector $\mathbf{w}$ with $\mathbf{u} - 2\mathbf{w} = \mathbf{v}$.

3. **(a)** Find k so that $(k, 10, -15)$ is parallel to $(4, -4, 6)$.
   (b) Find all k with $\|(k, 2, k)\| = 6$.

4. $A(-2, 4, 1)$ and $B(7, -2, 10)$. Find the midpoint of AB, and the point P two thirds of the way from A to B.

5. Three corners of the parallelogram $ABCD$ are $A(1, -2, 3)$, $B(4, 0, 5)$, $C(6, 3, 4)$. Find D and verify it.