Ex 1 Let

$$A = \begin{pmatrix} -1 & 4 & 2 \\ 5 & 0 & 3 \\ -3 & -1 & 0 \end{pmatrix}$$

(a) Compute each of the minors of A.

(b) Compute each of the cofactors of A.

(c) Compute $\operatorname{cof}(A)$.

(d) Compute $\operatorname{adj}(A)$.

(e) Does A^{-1} exist? If so, what is A^{-1}?

(f) Find all solutions to the system of equations

$$A\vec{x} = \begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix}.$$

(g) Use Cramer's Rule to find all solutions to the system of equations in the previous part.

Ex 2 Find a polynomial of degree at most 3 which passes through the points $(1, 2), (-1, 3), (2, 5)$, and $(-2, -4)$.

Ex 3 Let $\vec{v} = \left(\begin{smallmatrix} -1 \\ 2 \end{smallmatrix}\right)$ and $\vec{w} = \left(\begin{smallmatrix} -3 \\ -3 \end{smallmatrix}\right)$. For each part of this problem, draw all listed vectors on a single axis (you may draw more than just the listed vectors if it is helpful).

(a) $\vec{v}, \vec{w}$

(b) $\vec{v} + \vec{w}, \vec{v} - \vec{w}$

(c) $2\vec{v}, \frac{1}{2}\vec{v}, -3\vec{v}$

(d) $3\vec{v} - 2\vec{w}$.

Ex 4 Let $P = (1, -2, 1), Q = (-3, 0, 5), X = (2, -1, 5)$, and $Y = (4, -2, 3)$. Is $\overrightarrow{PQ}$ parallel to $\overrightarrow{XY}$?

Ex 5 Recall the Triangle Inequality: for every vector $\vec{u}$ and $\vec{v}$ in $\mathbb{R}^n$, $\|\vec{u} + \vec{v}\| \leqslant \|\vec{u}\| + \|\vec{v}\|$.

(a) Explain why the Triangle Inequality is true.

(b) Explain why it is called the Triangle Inequality.

(c) Find an example of vectors $\vec{u}$ and $\vec{v}$ in $\mathbb{R}^2$ so that $\|\vec{u} + \vec{v}\| < \|\vec{u}\| + \|\vec{v}\|$.

(d) Find an example of vectors $\vec{u}$ and $\vec{v}$ in $\mathbb{R}^2$ so that $\|\vec{u} + \vec{v}\| = \|\vec{u}\| + \|\vec{v}\|$.

(e) Explain when the left- and right-hand sides of the inequality are actually equal.