Problem 1

Consider the vector $(5, 3)$, expressed in the standard basis (i.e. $\{(1, 0), (0, 1)\}$). What are its coordinates with respect to the basis defined by $B = \{(1, 1), (1, -1)\}$?

Problem 2

Recall that a function $f : \mathbb{R} \to \mathbb{R}$ is linear if $f(cx) = cf(x)$, and $f(x + y) = f(x) + f(y)$. Are the following functions linear:

a) $f(x) = 2x$,

b) $f(x) = x^2$,

c) $f(x) = x + 2$?

Problem 3

Let ABC be a triangle. Is it true that there exists only one point M, such that $MA + MB + MC = 0$? What if we change the condition to $2MA + MB + MC = 0$?