Name:

Problem 1: *Suppose that the vector*

$$\vec{s} = \begin{pmatrix} s_1 \\ s_2 \\ \ddots \\ s_n \end{pmatrix}$$

is a solution to the equation

$$a_1x_1 + a_2x_2 + \ldots + a_nx_n = 0.$$

Prove that the vector $3\vec{s}$ is also a solution of the equation above.

Solution: To check that something is a solution, we plug in and see if we get the correct answer:

$$\begin{aligned} a_1(3s_1) + a_2(3s_2) + \ldots + a_n(3s_n) &= 3a_1s_1 + 3a_2s_2 + \ldots + 3a_ns_n \\ &= 3(a_1s_1 + a_2s_2 + \ldots + a_ns_n) \end{aligned}$$

Because $\vec{s}$ is a solution to the original equation, we have

$$a_1s_1 + a_2s_2 + \ldots + a_ns_n = 0,$$

as the equation claims.
Therefore,

$$\begin{aligned} a_1(3s_1) + a_2(3s_2) + \ldots + a_n(3s_n) &= 3(a_1s_1 + a_2s_2 + \ldots + a_ns_n) \\ &= 3 \cdot 0 = 0, \end{aligned}$$

and $3\vec{s}$ is also a solution of the equation.