Homework 2 Problem 1 Solution

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Problem 1.
By Vieta's theorem, $2p$ and $p+q$ being roots of the quadratic equation x^2+px+q is equivalent to the following system of equations:

$$2p+(p+q)=-p \tag{1}$$

$$2p(p+q)=q \tag{2}$$

From the first equation we get $q=-4p$. Plugging this into the second equations yields $2p\cdot(-3p)=-4p$, which means $p=2/3$ or $p=0$. The latter case would imply $q=0$, which is not allowed as $p\neq q$. Then $p=2/3$, and so $q=-8/3$.