MATHSCI Problems

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1. Suppose x_1 and x_2 are the roots of

$$x^2 + x - 7 = 0.$$

Without solving for the roots, find

(a) $x_1^2 + x_2^2$.

(b) $x_1^3 + x_2^3$.

(c) $x_1^4 + x_2^4$.

Hint. It's possible to find sums and products of the roots without finding the roots themselves.

2. What is the difference between boiling and evaporation? Think about the similarities and differences. Focus on the essential features of both. Make a distinction between what is essential and what is not essential.

3. There are three fundamental circuit elements: resistor, capacitor and inductor. Why are they considered to be fundamental? Can we design other circuit elements that are not resistors, capacitors or inductors and build circuits out of them? Can there be other kinds of fundamental circuit elements or are these three unique? Why?

Comment. I don't expect an immediate answer to this. It may take weeks, months or years of thinking. Just keep this question in mind as you learn about electricity and electric circuits. Take your time thinking about this.