Suppose you have several nickels (5 cents) and dimes (10 cents). Find a solution to each of the following seven problems by finding how many *nickels* and *dimes* would be needed to satisfy the one or two or three condition(s) **in bold**.

Nickels	Dimes	
		You have 6 coins. You have five times as many dimes as nickels. You have 75 cents.
		You have 6 coins. **You have five times as many dimes as nickels.** You have 75 cents.
		You have 6 coins. You have five times as many dimes as nickels. **You have 75 cents.**
		You have 6 coins. **You have five times as dimes as nickels.** You have 75 cents.
		You have 6 coins. You have five times as many dimes as nickels. **You have 75 cents.**
		You have 6 coins. **You have five times as many dimes as nickels.** **You have 75 cents.**
		You have 6 coins. **You have five times as many dimes as nickels.** **You have 75 cents.**

Thoughts

- Each constraint is an equation whose unknowns are the values we are looking for (which is why I call the values we want *unknowns* instead of *variables*).

- Consider the first and third constraints. What if we changed the first constraint about the number of coins to be 7 coins instead of 6? What would the solution be (it's now a fraction), and how would you find it?
    - Visually: not very exact, and what if we have more than two unknowns?
    - Algebraically: the most reliable approach. And what if we had a larger problem, such as 10 equations and 10 unknowns?

  Same question, but change 6 to 5 (solution is now negative).

- Guessing answers is OK for really simple problems, but we need a more reliable way to find a solution for more complicated problems. This approach should also allow us to know that a problem has no solution (if that is the case) or it should find all of solutions (if it has multiple solutions). This is what sections 2.1 and 2.2 are about.

- Sometimes a problem has a solution that is true mathematically but doesn't make sense for the real life problem.

- Number of unknowns (variables) vs. constraints (equations):

# unknowns vs. # constraints	# solutions
>	∞
=	1
<	0

- Is there some way we could change the third constraint so that all three constraints are met (that is, could we change the 75 to some other number so that there is a solution to the problem with all three equations)? Yes,