Systematic decomposition

To solve a problem we need to go through several levels of transformation:

- Problem statement
- Algorithm
- Program

... 

In systematic decomposition, complex tasks are broken down into simpler tasks.
LC-3 instructions to implement constructs

* Sequential construct:
  Subtasks are executed one after the other

Flowchart:

1. Subtask 1
2. Subtask 2
Example: \[ R_4 \leftarrow R_1 + R_2 + R_3 \]
* Conditional construct:

Flowchart:

1. Use condition codes (N, Z, P) to test
2. Use conditional branch (BR) to choose subtask to execute
3. Use unconditional branch to transfer control after finishing subtask 1
Example: \( R_2 \leftarrow |R_1| \)
* Iterative construct:

Flow chart:

- Condition
  - T → Subtask K
  - F

1. Use condition code ($N, Z, P$) to test
2. Use conditional branch (BR) to finish iterating
3. Use unconditional branch to test again
Example:  

\[ R_1 \leftarrow 0 \]
\[ \text{while } (R_1 < 4) \]
\[ R_1 \leftarrow R_1 + 1 \]