

# Dynamic Programming

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## Dynamic Programming:

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Dynamic programming is a technique for solving problems recursively and is applicable when the computations of the subproblems overlap

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## DP Tools:

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- Memoization (Top down)
  - an optimization technique where you cache previously computed results, and return the cached result when the same computation is needed again
  - storing the results of expensive function calls and returning the result when the same inputs occur again
- Tabulation (Bottom Up)
  - using iterative approach to solve the problem by solving the smaller sub- problems first and then using it during the execution of bigger problem
- Comparison
  - memoization usually requires more code and is less straightforward, but has computational advantages in some problems
    - \* mainly those which you do not need to compute all the values for the whole matrix to reach the answer
  - tabulation is more straightforward, but may compute unnecessary values
    - \* if you do need to compute all the values, this method is usually faster, though, because of the smaller overhead

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## Examples:

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- Longest Common Subsequence problem
- Knapsack
- Travelling salesman problem

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## Sources:

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- <http://stackoverflow.com/questions/12042356/memoization-or-tabulation-approach-for-dynami>