- # Q1:
  - Admissible heuristics:
    - It's a concept in search algorithms where a heuristic is considered admissible if it never overestimates the cost to reach the goal from any node in the search space.
  - "h=0" as a heuristics for a problem: it's admissible
    - "h=0" means there is no estimated cost from the current node to the goal because the estimate is always 0. It's admissible since the "h=0" always either underestimates or equals the true cost to reach the goal and never overestimates.
  - I can't say the "h=k" heuristics (where k is a constant) is admissible.
    - One requirement of admissibility is the heuristics can't overestimate the true cost from the current node to the goal. If "h=k" and say k=1 and that is fixed and not changing if the cost of reaching the goal from a node is less, then this heuristics will overestimate.
  - h = min(h1, h2, h3) is admissible:
    - If there is one of them that is admissible, then $h_{min} \leq$ any of the 3 h1, h2, h3. That means either it will underestimate or calculate the true cost but never overestimate.

  - h = max(h1, h2, h3) is not admissible
    - Unless h_{max} = the heuristics that is admissible, it will overestimate the true cost and thus will be inadmissible.
- # Q2:
  - Link: https://github.com/Initiated0/CSCE580-Fall2024-nayeem-Repo/tree/main/Quizzes/Quiz2
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- # Q3:
  - ## CSP
    - Variables: T, W, O, F, U, R; the characters that need to be mapped.
    - Domains: Each variable (T, W, O, F, U, R) has the domain D={0,1,2,3,4,5,6,7,8,9}
    - Constraints:
      - Uniqueness $T \neq W \neq O \neq F \neq U \neq R$
      - TWO + TWO = FOUR ; this sum must hold.
        - 2 x (100T + 10W + 1O) = 1000F + 100O + 10U + 1R… … … …. … # 1
      - Range constraint: Domains must be between 0-9
      - In the sum leading letters cant be 0 ($T \neq 0$) ($F \neq 0$)

- Solving with node, arc, and path consistency
  - Node consistency:
    - Initially, all variables had D = {0,1,2,3,4,5,6,7,8,9} but we realized that we can't have ($T \neq 0$) ($F \neq 0$).
    - So, for D_T = {1,2,3,4,5,6,7,8,9} and D_F = {1,2,3,4,5,6,7,8,9}
  - Arc consistency:
    - We must ensure there is consistency and no overlapping in variable's domain for every possible pairs of variables.
    - If $T \neq W \neq O \neq F \neq U \neq R$, then $D_T \neq D_w \neq D_o \neq D_F \neq D_U \neq D_R$
  - Path consistency:
    - Path consistency ensures that any value assignment for one variable is consistent with value assignments for two other variables along the path.
  - Solution:
    - Node and arc consistency reduces the search space by decreasing the domains of the variables.
    - Next is checking possible combinations of values for the variables T,W,O,F,U,R to satisfy the equation # 1