1. For T(n) = 2T(n/2) + n, one tree level costs –

   ☐ 1

   ☐ n log n

   ☐ n

   ☐ n/2

2. Binary search recurrence is –

   ☐ T(n/2) + 1

   ☐ 2T(n/2) + n

   ☐ 2T(n/2) + 1

   ☐ T(n-1) + n

3. The exchange argument shows –

   ☐ greedy always fails

   ☐ nothing

   ☐ optimal can afford greedy choices

   ☐ greedy is fast

4. The DP design is –

   ☐ the cache library

   ☐ the loop structure

   ☐ recurrence + base cases + fill order

   ☐ the recurrence only

5. The light edge crossing a cut is –

   ☐ always the heaviest

   ☐ irrelevant

   ☐ never in any MST

   ☐ in some MST – safe to accept

6. How many distinct tours does a symmetric travelling-salesman instance on 8 cities have?

   _____

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_____

8. Karatsuba on 23 x 45 splits into a = 2, b = 3, c = 4, d = 5. What is the middle term (a+b)(c+d) - ac - bd?

   _____

9. Fractional knapsack, capacity 6, items (weight, value) (2, 6), (3, 6), (4, 4). What is the best total value?

   _____

10. What is the length of the longest common subsequence of ABCD and ACBD?

    _____

1. **n**

   Level i has 2^i nodes of n/2^i: the product is n at every level.

2. **T(n/2) + 1**

   One recursive call, constant combine: Theta(log n).

3. **optimal can afford greedy choices**

   Swap optimal picks for greedy ones losslessly: same size, still feasible.

4. **recurrence + base cases + fill order**

   Three parts: what a cell means, where it starts, which direction to fill.

5. **in some MST – safe to accept**

   Tree + light edge - cycle other edge keeps or lowers the weight.

6. **2520**

   Fix the start and divide by 2 for direction: 7! / 2 = 2520.

7. **63**

   32 + 16 + 8 + 4 + 2 + 1 = 63, under 2 x 32.

8. **22**

   (5)(9) = 45, minus 8 and 15, gives 22; the product is 800 + 220 + 15 = 1035.

9. **13**

   Ratios 3, 2, 1: take all of (2,6) and (3,6), then 1/4 of (4,4) for 1 more: 6 + 6 + 1 = 13.

10. **3**

    ABD (or ACD) appears in both, in order; no common subsequence has 4 letters.

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