Understanding

- Read Q carefully, catch [keywords] with annotation + critical thinking
- Terms
 - Compare definitions with purposes (NOT the same!)
 - concise and complete declaration VS intention or objective
- Algorithm, Software, Examples
 - [Which] Name
 - [Input] assumptions/conditions/constraints
 - foundation of reasoning / fill incomplete info/gap
 - exclude potential limitations
 - [Output] requirements
 - [How] methods, description, main steps
 - [Why] Motivation / Intention / Purposes
 - [Extra] speedup, comparison (caveats and advantages)
- $rac{d}{dr}$ Read your answer and check the question

Analyse

- Find a pattern by numerating from **easy examples**.
- Case Split
 - Consider complement as well if simpler.
 - Consider empty, 0, 1, infinity and other special cases.
- Use some diagrams, tables, graphs and other colors to help understanding.

Math

- Don't SKIP necessary steps during calculation
- Simplify
 - 1. Extract common terms and put unrelated stuff in Const [Const] [Var(x,y,z)Only]
 - 2. Don't forget Const when integration
- Substitution
- Check Divide by 0, multiple both sides by 0 [CaseSplit!]
- Graph: undefined, key points, asymptotes, limit (0, infinity); domain, codomain, odd and even.

Express ideas

- **Pencil** for code or diagram, leave spare lines for improvement.
- Define what you use.

Let x to be <...>

- Ceiling and Flooring when needed [x], [x] [Q with high marks]
- Write more to explain your idea when needed
- Use some diagrams, tables, graphs and other colors for expression.
- Calculate the final results for the ease of marking.
- Have a summary when needed

Proof

```
Assume ... (1)
RTP:
By (1) and (2), we know ..., we get ...
Hence, ...
This corresponds to C, as required.
```

• Making sure that conditions/assumptions are met

Decision on whether disproof or proofx

- Analyse with intuition.
- Disproof
 - Give a solid counter-example satisfying all the conditions, but not the conclusions given.
- Proof
 - Contradiction when conditions are scarce.
 - \circ Induction, state (IH) with ϕ
 - Mathematical induction on N
 - Rule induction
 - Structural induction (more inversion needed)
 - algorithms, Regex, etc.

Essay

Planning with bullet points before writing

Introduction

• Discuss other people's views and give your opinion

Body

- Point (underline)
 - Statement
- Evidence
 - Explain with lecture notes, references and facts
 - Critical evaluation (limitation, gap)
 - Discussion

- non-trivial, further
- Relate back to question

Conclusion

Coding

- Have a clear design of algorithm
 - Input and Output
 - Data structure details
 - Complexity
- Assertion to ensure invariant.
- Case Split:
 - Special Case:
 - [Segment Fault] NULL assert(isRight==right);
 - [Infinity Loop] Condition for termination
 - Tree node : NULL/ Leaf

Debugging

- Unit Test for accuracy.
- Make the test case simpler
- printf / step-by-step
- Rethink the problem, check what is being asked.
- Random guessing ...
- Test it before real operation for accuracy. [OS]