

Review and Extension: Constructions, Sequences, Polynomials

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1 Key concepts for this term

- Existence results: infinitude of primes, Bezout, CRT, pigeonhole
- Techniques for controlling constructions
- Factor theorem, remainder theorem
- If a and b are integers, then $a - b \mid p(a) - p(b)$
- Finite differences
- Division algorithm for polynomials
- Rational root theorem
- Sequences and integer functions

2 What Now?

You now know all of the number theory that you need to solve problems at the AMO and AMOC Senior Contest. To turn this knowledge into results, you will need to familiarise yourself with this toolkit and how each of the tools within it can be applied in different situations. For this, there is no substitute for practice.

My Camp-Level course builds upon the foundation that we have laid in Senior-Level. It includes a selection of more challenging problems to help you practice using the results and techniques that we have covered this year, as well as more advanced content that is necessary for solving harder problems, such as those appearing on team selection tests and at the IMO.

Apart from the problems on these handouts, the best place to go for practice problems is AoPS, especially the pages for national olympiads (<https://artofproblemsolving.com/community/c58>) and TSTs (<https://artofproblemsolving.com/community/c59>) However, note that solutions on AoPS are user-contributed and often incorrect.

3 Homework

Solve and submit any three problems from the Problems sections of this term's handouts that weren't covered in class.

Also complete the feedback form: <https://forms.gle/fR78jMzBeHKWy7nM7>