## Advanced Analysis of Algorithms

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- 1. Loop invariance. Break up a statement S into  $S_0$ ,  $S_1$ , etc. The initial claim  $S_0$  is true before the start of the loop. If  $S_{i-1}$  is true before the  $i^{th}$  iteration commences, then  $S_i$  is true, after the  $i^{th}$  iteration. The final statement  $S_k$  implies S. Use array-max. Pascal array.  $S_i : x$  is not equal to the first i 1 elements of  $\mathbf{A}$ .
- 2.  $g(n) \in o(f(n)) \Rightarrow g(n) \in O(f(n)) \Omega(f(n)).$
- 3. Seven properties of order from the book.
- 4. Using limits to determine order, L'Hospital's rule.
- 5.  $\log^b n = o(n^{\epsilon})$ , for all  $b, \epsilon > 0$ .