In-class exercises: Asymptotic notation

1. (R-1.2) Algorithm A uses $10n \lg n$ operations, while algorithm B uses n^2 operations. Determine the value n_0 such that A is better than B for $n \geq n_0$.

2. (R-1.7) Let $f(n) = \lg n$ and assume that we have an algorithm whose running time is $f(n)$ microseconds. Determine the largest size of a problem that can be solved by the algorithm in: (a) 1 second; (b) 1 hour; (c) 1 month; (d) 1 century.

   Same problem for $f(n) = \sqrt{n}$ and $f(n) = n$.

3. (R-1.6) Order the following expressions from fastest to slowest:

$$\sqrt{2}^{\lg n}, n^2, \left(\frac{3}{2}\right)^n, n^3, \lg n^2, \lg^2 n, 2^n, \lg \lg n, n \lg n$$