

Math 15 - Spring 2017 - Homework 4.6 Solutions

1. (4.6 # 24) An urn contains n distinct balls.
 - (a) Give a big- Θ estimate for the number of ways to draw a sequence of three balls with replacement.
ANS: n^3
 - (b) Give a big- Θ estimate for the number of ways to draw a sequence of three balls without replacement.
ANS: $n(n-1)(n-2) = \Theta(n^3)$
 - (c) Give a big- Θ estimate for the number of ways to draw a sequence of n balls without replacement.
ANS: $\Theta(n!)$
2. (4.6 # 28) A certain algorithm processes a list of n elements. Suppose that Subroutine a requires $n^2 + 2n$ operations and Subroutine b requires $3n^3 + 7$ operations. Give a big- Θ estimate for the number of operations performed by the following pseudocode segment.

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for i ∈ {1, 2, ..., n} do
    Subroutinea
    Subroutineb
ANS:  $\Theta(n^3)$ 
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3. (4.6 # 32) Explain why the relation on functions $N \rightarrow \mathbb{R}^+$ defined by

$$fRg \Leftrightarrow f = O(g)$$

is not an equivalence relation.

It's not symmetric. For instance, $\ln(n) \in O(n)$ but $n \notin O(\ln(n))$