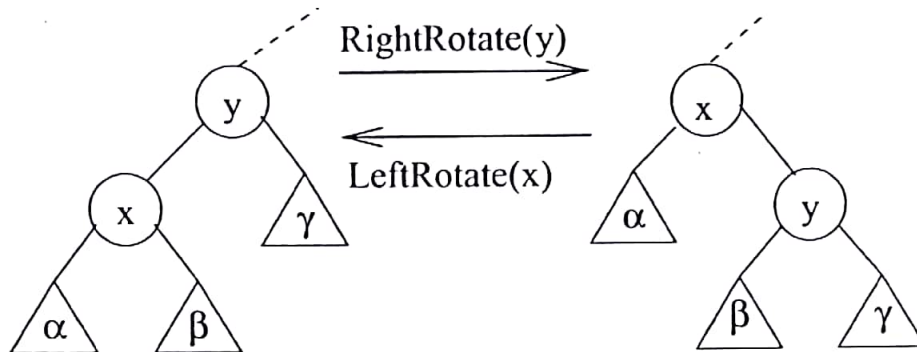علی نیکوی

۹۴۳۱۰۷۵۵

Rotation Worksheet

The following schematic describes the left and right rotation operations on a frage-ment of a binary search tree. Circles represent nodes (as usual) and triangles represent sub-trees. A sub-tree will typically have one or more nodes but could be empty.

Your task. should you choose to accept it. is to apply a LeftRotate operation at the node containing 15 on the tree below and draw the resulting tree.
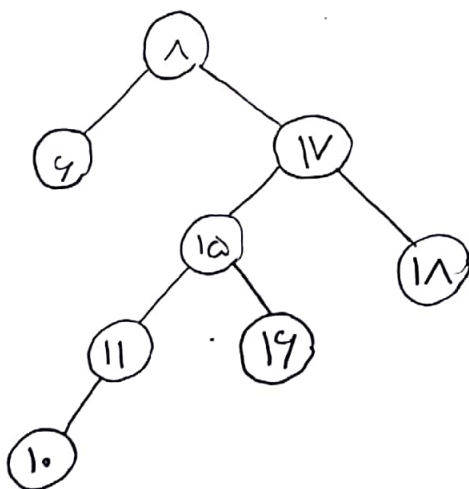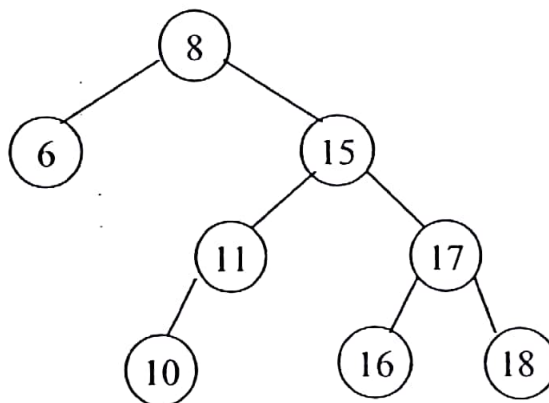
Birthday Paradox Worksheet

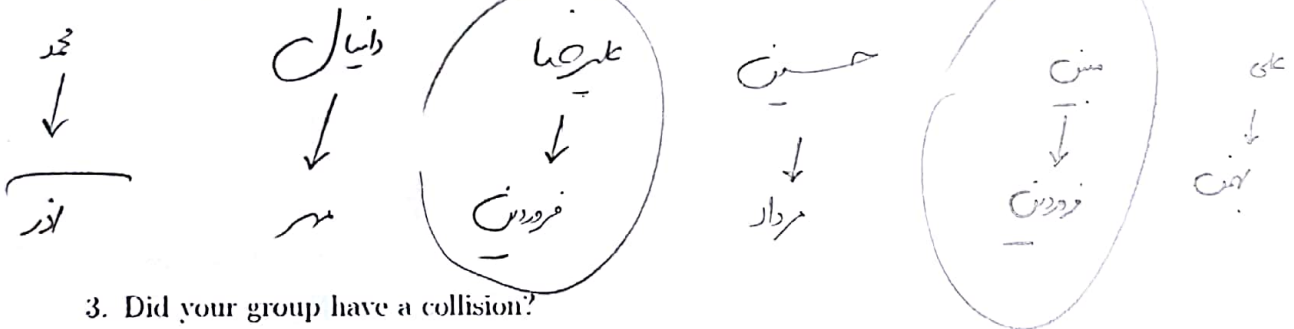1. The probability of there being no collisions after n insertions into an m-element hash table is

$$\frac{m}{m} \times \frac{m-1}{m} \times \cdots \times \frac{m-n+1}{m} \qquad (1)$$

If $m = 12$ (number of months in a year), what is the smallest value of n for which the probability drops below $1/2$.

$$\underbrace{\frac{12}{12} \times \frac{11}{12} \times \cdots \times \frac{12-(n-1)}{12}}_{\bar{L}\,n} < \frac{1}{2} \longrightarrow$$

$$\begin{cases} n=2 \longrightarrow \frac{12}{12} \times \frac{11}{12} = \frac{11}{12} \not< \frac{1}{2} \quad \times \\[2mm] n=3 \longrightarrow \frac{12}{12} \times \frac{11}{12} \times \frac{10}{12} \not< \frac{1}{2} \quad \times \\[2mm] n=4 \longrightarrow \frac{12}{12} \times \frac{11}{12} \times \frac{10}{12} \times \frac{9}{12} \not< \frac{1}{2} \quad \times \end{cases}$$

$$\implies n = 5 \implies \frac{12}{12} \times \frac{11}{12} \times \cdots \times \frac{8}{12} < \frac{1}{2} \quad \checkmark$$

2. Form groups of 5-7 students and write down everyone's birth-month.

محمد
↓
آذر

دانیال
↓
مهر

علیرضا
↓
فروردین

حسین
↓
مرداد

مبین
↓
فروردین

علی
↓
بهمن

3. Did your group have a collision?

بله