Master Theorem. For the recurrence $T(n) = aT(n/b) + cn^d$.
If $a < b^d$: $T(n) \in \mathrm{O}(n^d)$
If $a = b^d$: $T(n) \in \mathrm{O}(n^d \lg n)$
If $a > b^d$: $T(n) \in \mathrm{O}(n^{\log_b a})$

Geometric Series.

$$\sum_{i=0}^{n} r^i = \frac{1 - r^{n+1}}{1 - r}$$
$$\sum_{i=0}^{\infty} r^i = \frac{1}{1 - r}$$

Stirling's Formulae.

$$\ln n! \approx n \ln n - n$$
$$n! \approx n^n e^{-n} \sqrt{2\pi n}$$
$$n! \approx \sqrt{2\pi} n^{n+1/2} e^{-n}$$

Splay Tree Rotations.

```
                          y             x
Zig (terminal case):     /     ====>     \
                        x                 y

                 z              z
                /              /             x
Zig-zag:       y     ====>    x   ====>     / \
                \            /             y   z
                 x          y

                 z                         x
                /            y              \
Zig-zig:       y     ====>  / \   ====>      y
              /            x   z              \
             x                                 z
```

Access Lemma. The number of primitive rotations to splay node x in a tree rooted at t is at most $3(r(t) - r(x)) + 1$, where $r(x)$ denotes *rank*, or the floor of the log base 2 of the subtree rooted at x.