

An *ordered partition* of $[n]$ is a partition (B_1, \dots, B_k) , where the order of the blocks matters. (Thus $(\{1, 2\}, \{3\})$ and $(\{3\}, \{1, 2\})$ are different ordered partitions of $[3]$.) Let $OS(n, 3)$ be the number of ordered partitions of $[n]$ into 3 nonempty blocks. Thus $OS(n, 3) = 3!S(n, 3)$.

- (a) Find an explicit formula for the exponential generating function

$$OS_3(x) = \sum_{n \geq 0} OS(n, 3) \frac{x^n}{n!}.$$

- (b) Deduce a formula for the numbers $OS(n, 3)$ and $S(n, 3)$.
- (c) Find the exponential generating function for the number of all ordered partitions of $[n]$.