Math555 Homework 10

Note: To submit the k-th homework, simply put your files in the folder `HWk` on CoCalc, and it will be collected on the due day.

1. Let $f(x) = (1 + x)^{-1}$. There are two ways to compute the formal power series of $f'(x)$. Firstly, compute $f'(x)$ as a function and then expand

   $$f'(x) = b_0 + b_1 x + b_2 x^2 + \cdots .$$

   Secondly, write

   $$f(x) = a_0 + a_1 x + x_2 x^2 + \cdots$$

   and then compute the formal derivative term-by-term

   $$f'(x) = c_0 + c_1 x + c_2 x^2 + \cdots .$$

   Show that $b_k = c_k$ for any $k \geqslant 0$.

2. Use Sage to write a function `perm_to_inv(per)` to compute the inversion table of the permutation `perm`. Also write a function `inv_to_perm(t)` to compute the permutation for the inversion table `t`. See the file `SageProject5_blank.sagews` in your CoCalc folder.