

**Fall 2022, Math 621: Preliminary Problem Set 5**  
**Due: Thursday, February 24th, 2022**  
**Rational Generating Functions**

**Preliminary problems.** These problems should be completed before discussion on Thursday.

(P1) Let  $A(z) = \sum_{n=1}^{\infty} z^n = z + z^2 + z^3 + z^4 + \dots$ . Note the first term!

(a) Write out the first 4 nonzero terms of  $(A(z))^2 = (z + z^2 + z^3 + \dots)(z + z^2 + z^3 + \dots)$ .

(b) Write out the first 4 nonzero terms in the composition  $A(A(z))$ . Show enough work to easily recall where each term comes from.