C&O 330 - ASSIGNMENT #2

DUE FRIDAY, 8 OCTOBER AT 10:31PM

This assignment is about partitions. The questions are taken from the Exercises of Section 2.4 (page 38) of the Course Notes.

A **(15 points)** Question 2.

B **(15 points)** Question 3.

C **(15 points)** Question 6.

D **(15 points)** Question 8.

E **(15 points)** Let q and t be indeterminates, and let $F_n(t,q) = \prod_{i=0}^{n} \left(1 - tq^i\right)^{-1}$. This has a power series expansion of the form $F_n(t,q) = 1 + \sum_{k \geq 1} t^k c_{k,n}(q)$, so

$$c_{k,n}(q) = \left[t^k\right] F_n(t,q).$$

The problem is to determine this coefficient. By considering an expression for $F_n(tq,q)$ that involves $F_n(t,q)$, prove that

$$c_{k,n}(q) = \prod_{i=1}^{k} \left(1 - q^{n+i}\right)\left(1 - q^i\right)^{-1}.$$

F **Bonus**: **(15 points)** Find a natural bijection that accounts of the result given in Question A.