MATH 636, Fall 2015
Homework C
Due 3:10pm on Thursday, October 29.

Assignment: Turn in written or typed solutions to homework questions 8-1, 9-1 parts (d) and (e), 10-1, and Question C-1:

C-1. Revisit homework question 2-1. Set up a *multivariate* generating function

$$A(q,r) = \sum_{c\geq 0}\sum_{n\geq 0} a_{cn} q^c r^n$$

where a_{cn} is the number of ways in which c cents can be made using n coins. This generating function starts out:

$$A(q,r) = q^0r^0 + q^1r^1 + q^2r^2 + q^3r^3 + q^4r^4 + q^5(r + r^5) + q^6(r^2 + r^6) + \cdots .$$

(a) Determine the compact form of $A(q,r)$, which gives the number of ways to make change for any amount of money using only pennies, nickels, dimes, and quarters.

(b) Use *Wolfram Alpha* or *Mathematica* to explore at the coefficients of this generating function.

[*Hint: You will have to expand the Taylor series twice, once in each variable.*]

(c) Use your answer from part (b) to explain why the answer to the Question 2-1 is 39 cents, and find the smallest monetary amount that is expressible in exactly k with exactly 15 coins for $3 \leq k \leq 6$.

Follow the posted homework guidelines when completing this assignment.
Please **only** consult with your classmates or professor to discuss the problem set.
In particular, remember that you must **fully justify** any assertions you make.