## UW Math Circle January 5th, 2017

1.	You have a 5 dollar bill, and you exchan	ge it wit	th a cashier i	for coins.	The cas	shier
	gives you 31 coins consisting of pennies.	, nickels,	and dimes.	Did the	${\rm cashier}$	give
	you 5 dollars?					

2. You have a bag of coins that contains pennies, nickels, dimes, and quarters. How many coins do you have to grab out of the bag to ensure that you have at least 2 coins of the same type?

3. You have 25 bags of potato chips. Each bag is either sour cream and onion, salt and vinegar, or barbeque flavored. What is the largest number of bags of the same flavor that you can guarantee that you have?

- 4. (a) You and 4 of your friends help a neighbor move some furniture. The neighbor pays your group 50 dollars, but she doesn't give everyone the same amount of money. Does at least one among you and your friends now have enough money to buy a \$ 9.99 album on itunes?
  - (b) You end up having enough money to buy an album that costs \$17.99. Is it possible that each of your 4 friends has enough money to buy a \$9.99 album?

5.	A class of 15 students gathers 100 rocks. Show that at least two students gathered the same number of rocks.
6.	You have 12 integers. Show that two of them have a difference that is divisible by 11.
7.	You have an $8\times 8$ chessboard, and you want to color some squares green. What is the largest number of squares that you can color green so that there is no L-shaped tromino in your chessboard colored green?
8.	Show that there is an integer whose decimal representation consists only of 1s and that is divisible by 2017.