

## HOMEWORK #6

DATE: FEBRAURY 7, 2018 : DUE: FEBRUARY 28, 2018

Explain your answers carefully to the questions below

Recall that  $n! = n \cdot (n - 1) \cdot (n - 2) \cdots 3 \cdot 2 \cdot 1$ .

- (1) How many zeroes are there at the end of  $10!$  ? How many at the end of  $100!$  ? How many zeroes are there at the end of  $1,000,000!$  ?
- (2) What is the last nonzero digit at the end of  $10!$  ? What is the last nonzero digit at the end of  $100!$  ? What is the last nonzero digit at the end of  $1,000,000!$  ?
- (3) Find a formula for the number of solutions to

$$x_1 + x_2 + x_3 + \cdots + x_k = n$$

where  $n \geq 0$  and the the  $x_i$  are non-negative integers. For instance, if  $n > 0$  then there is exactly one solution to  $x_1 = n$ . There are  $n + 1$  solutions to  $x_1 + x_2 = n$ . How many solutions to the equation  $x_1 + x_2 + x_3 = n$  are there when  $k = 3$ ? Make a table of values for various  $n$  and  $k$  and generalize your answer for  $k > 3$ .