ANSWERS

A) _____

B) _____

C) _____ : _____

A) Let $\hat{n} = (2n + 1)!$ and $a \# b = \left(a^b + b^a\right)!$

   Compute $\dfrac{3 \# 2}{\hat{7}}$.

   Recall:
   $n!$ denotes a factorial.
   Specifically, $n!$ is defined as the product $n \cdot (n-1) \cdot (n-2) \cdot \ldots \cdot 1$ and $0! = 1$.

B) The combination padlock for my new laptop is three digits. It is factory preset at 000, but each position can be changed to any digit from 0 through 9 inclusive. How many different combinations are possible, if the sum of the three digits is 10?

C) 6 and 28 are the first two 'perfect numbers', i.e. the sum of the proper divisors, <u>excluding</u> the number itself, equals the number. ($6 = 1 + 2 + 3$ and $28 = 1 + 2 + 4 + 7 + 14$)

   Numbers for which the sum of the proper divisors is less than the number are termed <u>deficient</u>.
   Numbers for which the sum of the proper divisors is more than the number are termed <u>abundant</u>

   Compute $D : A$, the ratio of the number of deficient numbers to the number of abundant numbers for integers strictly between the first two perfect numbers.