ASSIGNMENT 2 (PART 1)

1) $6P_5 = 120$

2a) $20C_{12} = 125,970$

2b) $\dfrac{31!}{12!\,(31-12)!} = 141,120,525$

2c) $C(20+6-1,6) = 25C_6$
$$= 177,100$$

3a) $(7-1)! = 720$

3b) $(6-1)! \times 2! = 240$

3c) $(5-1)! \times 5 \times 2 = 240$

4a) $15C_{10} = 286$

4b) $15P_{10} = 1,087,886,800$

4c) $(10C9 \times 5C_1) + (10C_8 \times 5C_2) + (10C_7 \times 5C_3)$
$$= 30 + 155 + 120$$
$$= 285$$

5) Let pigeon = 30 students,
   Pigeonhole = 26 alphabets
   $\quad \hookrightarrow \left\lceil \frac{30}{26} \right\rceil = 2$ students

6) Let pigeon = number of students (at least 100)
   Pigeonhole = 13 states

   using pigeonhole — 3rd form
   $\quad \hookrightarrow n = 13(100-1) + 1$
   $$= 1288 \text{ students}$$

   F = female
   M = male

7a) Pigeon = 9 students   7b) when $(M \leq 3)$ then
    Pigeonhole = 2 genders $(F > 5)$,

    $\left\lceil \frac{9}{2} \right\rceil = 5$ students   when $(M > 5)$ then
                                          $(F \leq 5)$