

AMA2222 Lab7 (week 8)

7 The number of permutations of  $r$  out of  $n$  distinct elements is given by:

$$P_r^n = \frac{n!}{(n-r)!} = n \times (n-1) \times \dots \times (n-r+1)$$

where  $n!$  is the factorial of  $n$ .

$$n! = n \times (n-1) \times \dots \times 3 \times 2 \times 1$$

(i) Write a function called “factorial” that reads a positive integer  $n$  and return  $n!$ .

(ii) Write a function called “permute” that reads two positive integers  $n, r$  and returns  $P_r^n$ . You may assume  $n \geq r$ . You can make use of factorial or otherwise.

(iii) Using the function defined in (ii), write a program that displays  $P_r^n$  in table form as follows:

1									
2	2								
3	6	6							
4	12	24	24						
5	20	60	120	120					
6	30	120	360	720	720				
7	42	210	840	2520	5040	5040			
8	56	336	1680	6720	20160	40320	40320		
9	72	504	3024	15120	60480	181440	362880	362880	
10	90	720	5040	30240	151200	604800	1814400	3628800	3628800