Math 1116, Permutations Activity, Fall 2014 Name KEY

Instructions: Use permutations to count the number of things in each scenario. Write the permutation notation, express in terms of factorials, reduce, and then use the calculator if needed.

1. Suppose you and five more friends are standing in line. In how many different orders can you and your friends stand in line?

$6P6 = 6! = 720$

2. A deck of cards has 52 cards in it. You draw 5. In how many ways can the order of those 5 cards come out?

$52P5 = 311,875,200$

3. Suppose a lottery drawing has 39 balls in the machine. 7 balls are chosen. How many different ways can those 7 balls come out of the machine?

$39P7 = 7.75 \times 10^{10}$

4. How many different ways can you organize the numbers 1, 2, 3, and 4? Once you find how many, list them all.

$4P4 = 4! = 24$

1234	1243	1324	1342	1423	1432
2134	2143	2314	2341	2413	2431
3124	3142	3214	3241	3412	3421
4123	4132	4213	4231	4312	4321

5. There are 16 balls in billiard. In how many different orders can the balls be dropped in pockets if they all have to be cleared from the table?

$16P16 = 16! = 2.09 \times 10^{13}$

6. If a math department has 17 faculty members available to serve as officers for an advisory committee, in how many different ways can the officers be chosen?

if there are 4 officers (President, Vice President, Secretary & Treasurer) then $17P4 = 57,120$

7. Suppose you choose an 8 digit password that allows letters of both cases and numbers. How many different possibilities are there if you don't reuse any letter twice?

62 (= 26+26+10)

$62P8 = 1.36 \times 10^{14}$

8. How many different ways can we organize the letters A, B, C, D, E? Can you list them all?

$5P5 = 5! = 120$

ABCDE ABCED ABDEC ABDCE ACBDE ACBDE
ACDBE ACDEB ADBCE ADBEC ADCBE ADCEB
ADEBC ADECB ABECD ABEDC AEBCD AEBDC
AECBD AECDB AEDBC AEDCB BACDE BACED
BADCE BADEC BAECD BAEDC BCADE BCAED
BCDAE BCDEA BCEAD BCEDA BDACE BDAEC
BDCAE BDCEA BEACD BEADC BECAD BECDA
BEDAC BEDCA ACEBD ACEDB BDEAC BDECA
CABDE CABED CADBE CADEB CAEBD CAEDB
CBADE CBAED CBDAE CBDEA CBEAD CBEDA
CDABE CDAEB CDBAE CDBEA CDEAB CDEBA
CEABD CEADB CEBAD CEBDA CEDBA CEDAB
DABCE DABEC DACBE DACEB DAEBC DAECB
DBACE DBACE DBCAE DBCEA DBEAC DBECA
DCABE DCAEB DCBAE DCBEA DCEAB DCEBA
DEABC DEACB DEBAC DEBCA DECAB DECBA
EABCD EABDC EACBD EACDB EADBC EADCB
EBACD EBADC EBCAD EBCDA EBDAC EBDCA
ECABD ECADB ECBDA ECBAD ECDAB ECDBA
EDABC EDACB EDBAC EDBCA EDCAB EDCBA