MATH 120 Section 7.4 Permutations & Combinations

Factorial: $n! = n \cdot (n-1) \cdot (n-2) \cdot \cdots \cdot 2 \cdot 1$ Note: By definition, 0! = 1

Examples Compute the following Factorials

1) 5! 2) 4! 3) 3! 4) 2! 5) 1! 6) 0! 7) $\frac{7!}{6!}$ 8) $\frac{8!}{5!}$

9) $\frac{52!}{5!47!}$ 10) $\frac{12!}{4!(12-4)!}$

A permutation is an arrangement of objects in a specific order. [Order Matters]
Example: Awarding 1st place, 2nd place and 3rd to a group of 10 students in a spelling contest.

A combination is an arrangement of objects in any order. [Order Doesn't Matter]
Example: Choosing 3 students from a group of 10 students to participate on a team.

Examples Permutation or Combination?

11) Suppose that 7 people enter a swim meet. Assuming that there are no ties, in how many ways could the gold, silver, and bronze medals be awarded?

12) In a horse race, how many different finishes among the first three places are possible if 22 horses are running?

13) John bought a machine to make fresh juice. He has five different fruits: strawberries, oranges, apples, pineapples, and lemons. If he only uses two fruits, how many different juice drinks can John make?

14) How many different committees of 3 people can be chosen to work on a special project from a group of 9 people?

15) From a committee of 10 people, how many ways can we choose a chair, a vice-chair and a secretary?

16) From a committee of 10 people, how many ways can we choose a subcommittee of 3 people?

Calculating Permutations & Combinations

Permutation: The number of permutations of n objects taken r at a time (no repetition):	**Combination**: The number of combinations of n objects taken r at a time (no repetition):
$P_{n,r} = \frac{n!}{(n-r)!}$	$C_{n,r} = \frac{n!}{r!(n-r)!}$

Examples

16. Calculate the following. a) $P_{9,2}$ b) $C_{8,3}$

17. Calculate the above problems 11 - 16