KING SAUD UNIVERSITY

Practice problems for final

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1. What is the co-efficient of $x^3y^8z^4$ when expanding $(x + 2y^2 + 3z)^{11}$.

2. Calculate $5^{123} \bmod 12$.

3. Evaluate the value of $\prod_{i=0}^{n} \sum_{j=0}^{i} c$.

4. How many passwords of length 7 can you make using following symbols: a-z, A-Z, @, and 0-9. Each password must have at least one capital letter, and at least one digit.

5. Suppose we have three sets: *X*, *Y*, and *Z* of sizes n, m, ℓ respectively. Let set $W = X \times Y$ (cross-product of two sets), and let $E = P(W),$ that is the power set of *W*. Count the number of functions $f : Z \mapsto E$.

6. Solve using the Chinese remained theorem the system of equations,
$x \equiv 2 \bmod 9$
$x \equiv 5 \bmod 26$
$x \equiv 3 \bmod 55$
$x \equiv 6 \bmod 49$

7. How many different words can you make by re-arranging the letters of the name, *MOHAMMAD*. What if we insist that the first letter must be "M", how many different words can you make by re-arranging the other letters.

8. Suppose we have 6 men and 3 boys. How many ways can we arrange them so no two boys are together.

9. Express the gcd of the numbers 245 and 363 as a linear combination of both numbers.

10. How many ways can be distribute 20 students equally into 4 classrooms?

11. Suppose we have two sets, *A* and *B*. The function $f : A \to B.$ How many 1-1 functions are there if $\left|A\right| = 6, \left|B\right| = 10.$