

## MATH 481: HOMEWORK 1

- (1) Let  $X = \{a, b, c\}$ . Write down the addition and multiplication tables for the corresponding ring of sets  $P(X)$ .
- (2) Draw the divisor graph of 210. Compare with the subset graph of a set with four elements.
- (3) Show that if  $A \in P(X)$  has an inverse with respect to  $\cap$ , then  $A = X$ .
- (4) Use induction to prove that

$$\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}.$$

- (5) Derive a formula for  $\sum_{k=1}^n k^3$ .

- (6) If  $n = \prod_{i=1}^r p_i^{a_i}$ , show that the number of divisors of  $n$  is given by  $\prod_{i=1}^r (a_i + 1)$ .