(1) A coin purse contains eight dimes and five quarters; an experiment consists of choosing two coins from the purse.

(a) How many possible outcomes are there?

(b) In how many of those outcomes do you get two quarters?

(c) In how many of those outcomes do you get one quarter and one dime?
(2) Suppose $A$ is a set with 5 elements and $B$ is a set with 2 elements.

(a) How many functions are there from $A$ to $B$?

(b) How many one-one functions are there from $B$ to $A$?

(c) How many onto functions are there from $A$ to $B$?
(3) (a) \((27)\mod 8 =\) 

(b) \((-27)\mod 8 =\) 

c) \((7^{-1})\mod 5 =\) 

d) \((5^{-1})\mod 6 =\) 

e) \((2^{1001})\mod 7 =\)
(4) (a) Find \( \text{gcd}(87, 96) \) using the Euclidean GCD algorithm.

(b) Find \( (87^{-1}) \mod 96 \), if it exists; otherwise explain why it doesn’t exist.

(c) If \( p \) is a prime number, what is the number of units in \( \mathbb{Z}_p^2 \)?