1. (30 points)

- Given: $F = \sum_{w,x,y,z}(0, 1, 2, 3, 4, 5, 7, 14, 15)$

  ▶ Draw a Karnaugh map
  ▶ Find distniguished 1-cells
  ▶ Find the essential prime implicants
  ▶ Draw the reduced map
  ▶ Find the second essential prime implicants
  ▶ Find a minimal sum

2. (20 points)

a. Explain full subtractor. Design its truth table.

b. Express sum and carry based on mean terms and max terms.

c. Design its circuit.

d. Diagram using basic logic gates (optional).