NAME: SID:

Problem 1: (a) Find a particular solution of the recurrence $C_n = 3C_{n-1} + C_{n-2} + 6$. Show your work.

(b) Find a particular solution of the recurrence $C_n = 3C_{n-1} + C_{n-2} + 3 \cdot 2^n$. Show your work.

Problem 2: (a) Complete the statement of the inclusion-exclusion principle below:

Let $A_1, A_2, ..., A_k$ be finite sets. Then

$$\left| \bigcup_{i=1}^{k} A_i \right| =$$

(b) We have a group of 46 people, including 24 US citizens, 16 Canadian citizens, and 27 Mexican citizens. The numbers of dual citizens of each type, US and Mexico, or US and Canada, or Mexico and Canada, are all equal. No person has a triple citizenship. How many people have only Mexican citizenship? Show your work.

Problem 3: For each recurrence equation below, mark (circle) the correct solution.

Recurrence	Solution
(a) $f(n) = 4f(n/5) + 3n$	$\Theta(n^3)$
	$\Theta(\log n)$
	$\Theta(n^{4/5})$
	$\Theta(n^{\log_5 4})$
	$\Theta(n)$
	$\Theta(n^{\log_4 5})$
	$\Theta(n \log n)$
(b) $f(n) = 5f(n/4) + 3n$	$\Theta(n^3)$
	$\Theta(\log n)$
	$\Theta(n^{4/5})$
	$\Theta(n^{\log_4 5})$
	$\Theta(n)$
	$\Theta(n^{\log_5 4})$
	$\Theta(n \log n)$
(c) $f(n) = 4f(n/5) + 3$	$\Theta(n^3)$
	$\Theta(\log n)$
	$\Theta(n^{5/4})$
	$\Theta(n^{\log_5 4})$
	$\Theta(n)$
	$\Theta(n^{\log_4 5})$
	$\Theta(n \log n)$