

NAME:

SID:

---

**Problem 1:** Find a general solution of the recurrence  $A_n = 4A_{n-1} - 4A_{n-2} + 3n$ . Show your work.

**Problem 2:** (a) Give the definition of Euler's totient function  $\phi(n)$ .

(b) Give the formula for Euler's totient function.

(c) Compute  $\phi(6000)$ .

**Problem 3:** For each recurrence below, circle the correct solution (or “none of the above”).

Recurrence	Solution
(a) $f(n) = 16f(n/4) + 2n^2$	$\Theta(n)$ $\Theta(\log n)$ $\Theta(n^{3/4})$ $\Theta(n^{\log_4 3})$ $\Theta(n^2)$ $\Theta(n^{\log_3 4})$ $\Theta(n \log n)$ none of the above
(b) $f(n) = 4f(n/3) + 2n^2$	$\Theta(n)$ $\Theta(\log n)$ $\Theta(n^{3/4})$ $\Theta(n^{\log_4 3})$ $\Theta(n^2)$ $\Theta(n^{\log_3 4})$ $\Theta(n \log n)$ none of the above
(c) $f(n) = 4f(n/3) + 3n$	$\Theta(n)$ $\Theta(\log n)$ $\Theta(n^{3/4})$ $\Theta(n^{\log_4 3})$ $\Theta(n^2)$ $\Theta(n^{\log_3 4})$ $\Theta(n \log n)$ none of the above