CS2223
HW#1 SOLUTIONS

1. (*a*) MAKENULL(*S*), INSERT(*a*,*S*), MEMBER?(*a*,*S*)
(*b*,*c*) One possibility is to store the elements of *S* in the first *k* positions of array int *S*[*n*] in the order in which they arrive (unsorted)

MAKENULL(*S*) - $\Theta(1)$
INSERT(*a*,*S*) - $\Theta(1)$
MEMBER?(*a*,*S*) - $\Theta(k)$ where $|S|=k$

If the array *S* were sorted, then the analysis would be

MAKENULL(*S*) - $\Theta(1)$
INSERT(*a*,*S*) - $\Theta(k)$ where $|S|=k$
MEMBER?(*a*,*S*) - $\Theta(\lg n)$

2. (*a*) 1 sec = $c * n^2 = c * 1000^2$. Thus, $c=10^{-6}$. We solve for
s sec== $c * n^2 = 10^{-6} * 10000^2 = 10^{-6} * 10^8 = 100$ sec
(*b*) 1 sec=$c * n * \log n = c * 1000 * \ln 1000 = c * 1000 * \log_{10}1000 / \log_{10} = c * 3000 / \log_{10} e$
Thus, $c=\log_{10}e / 3000$. We solve for
s sec== $c * 10000 * \ln 10000 = 10000 * \ln 10000 * \log_{10}e / 3000 =$

$$\log_{10}1000 = 10000 * \frac{\log_{10}10000}{\log_{10} e} * \frac{\log_{10} e}{3000} = 13\frac{1}{3}$$ seconds.