1. (a) \textsc{MakeNull}(S), \textsc{Insert}(a,S), \textsc{Member?}(a,S)  
\( (b,c) \) One possibility is to store the elements of \( S \) in the first \( k \) positions of array \( \texttt{int} \ S[n] \) in the order in which they arrive (unsorted) 
- \textsc{MakeNull}(S) - \( \Theta(1) \)  
- \textsc{Insert}(a,S) - \( \Theta(1) \)  
- \textsc{Member?}(a,S) - \( \Theta(k) \) where \( |S|=k \)  
If the array \( S \) were sorted, then the analysis would be 
- \textsc{MakeNull}(S) - \( \Theta(1) \)  
- \textsc{Insert}(a,S) - \( \Theta(k) \) where \( |S|=k \)  
- \textsc{Member?}(a,S) - \( \Theta(\log n) \)

2. (a) \( 1 \text{ sec} = c \times n^2 = c \times 1000^2 \). Thus, \( c=10^{-6} \). We solve for 
\( s \text{ sec} = c \times n^2 = 10^{-6} \times 10000^2 = 10^{-6} \times 10^8 = 100 \text{ sec} \)  
(b) \( 1 \text{ sec} = c \times n \times \log n = c \times 1000 \times \ln 10000 = c \times 1000 \times \log_{10} 10000 / \log_{10} = c \times 3000 / \log_{10} e \)  
Thus, \( c=\log_{10} e / 3000 \). We solve for  
\( s \text{ sec} = c \times 10000 \times \ln 10000 = 10000 \times \ln 10000 \times \log_{10} e / 3000 = \)  
\( \log_{10} 10000 = 10000 \times \frac{\log_{10} 10000}{\log_{10} e} \times \frac{\log_{10} e}{3000} = 13 \frac{1}{3} \text{ seconds.} \)