JOHN SPINA HW7 P1

We can use an unsorted array. Inserting 2 elements will take $O(1)$ time since we can just add them onto the end. To perform half delete we can find the median and partition the array in half in $O(n)$ time, or dn. on average. So we always need at least dn in the bank so that we can perform a half-delete.

n	2	4	6	8	10
c_i	2	2	2	2	2
$\hat{c}_i$	2+4d	2+4d	2+4d	2+4d	2+4d
bank	4d	8d	12d	16d	20d

We are inserting two elements at a time in $O(1)$ time so that costs us 2, and we always need $2dn$ in the bank for a half-delete, so $\hat{c}_i = 2+4d$. When running half-delete we take dn time for $\frac{n}{2}$ elements which is $2d$ per element.

Φ = size, $c_i = k|A_{i-1}|$, $\Phi(A_i) = 2k|A_i|$, $\Phi(A_{i-1}) = 2k|A_{i-1}|$
$|A_i| = \frac{1}{2}|A_{i-1}|$

$\hat{c}_i = c_i + \Phi(A_i) - \Phi(A_{i-1}) = k|A_{i-1}| + 2k|A_i| - 2k|A_{i-1}| = k|A_{i-1}| + k|A_{i-1}| - 2k|A_{i-1}|$
$= 0$. Amortized cost is 0 for m operations, so they run in $O(m)$ time and $O(1)$ (constant) amortized time.