

Class work: Analysis warmup

Note: As usual, we denote the size of A by n .

```
BUBBLE-SORT( $A$ )
1 For  $k = 1$  to  $n - 1$ 
2     // do a bubble pass
3     For  $i = 0$  to  $n - 2$ 
4         if  $A[i] > A[i + 1]$ : swap
```

```
SELECTION-SORT( $A$ )
1 For  $i = 0$  to  $n-2$ 
2      $k =$  the index of the smallest element among  $A[i], A[i + 1], \dots, A[n - 1]$ 
3     swap  $A[i]$  with  $A[k]$ 
```

```
INSERTION-SORT( $A$ )
1 For  $k = 1$  to  $n - 1$ 
2      $key = A[k]$ 
3      $i = k - 1$ 
4     while  $i \geq 0$  and  $A[i] > key$ 
5          $A[i + 1] = A[i]$ 
6          $i = i - 1$ 
7      $A[i + 1] = key$ 
```

Analyse the best-case and worst-case running time for each of the sorting algorithms above. Give examples of inputs that trigger best-case and worst-case behavior, respectively.