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The Virtual Learning Environment for Computer Programming

Haskell — Sorting P29040_en

Implement some algorithms to sort lists.

1. Define a function **insert** :: [**Int**] → **Int** → [**Int**] that, given a sorted list and an element, correctly inserts the new element in the list.

   Define a function *isort* :: [**Int**] → [**Int**] that implements insertion sort using the previous function.

2. Define a function *remove* :: [**Int**] → **Int** → [**Int**] that, given a list and an element x, erases the first occurrence of x from the list. You can assume that the element is always in the list.

   Define a function *ssort* :: [**Int**] → [**Int**] that implements selection sort using the previous function.

3. Define a function *merge* :: [**Int**] → [**Int**] → [**Int**] that, given two sorted lists, merges them to get a list with all the elements in sorted order.

   Define a function *msort* :: [**Int**] → [**Int**] that implements merge sort using the previous function.

4. Define a function *qsort* :: [**Int**] → [**Int**] that implements quick sort.

5. Generalize the previous function into *genQsort* :: **Ord** *a* ⇒ [*a*] → [*a*] that sorts elements of any type.

Scoring

Each sorting algorithm scores 20 points.

Sample input 1

```
insert [10,20,30,40] 25
insert [10,20,30,40] 20
isort [6,5,2,5,6,8]
remove [6,4,3,5,2,3] 2
remove [6,4,3,5,2,3] 6
ssort [6,5,2,5,6,8]
merge [1,2,5,7,8] [2,4,7,9]
msort [6,5,2,5,6,8]
qsort [6,5,2,5,6,8]
genQsort [5.0,3.0,2.5]
genQsort ["jordi", "albert", "josep"]
genQsort "antaviana"
```

Sample output 1

```
[10,20,25,30,40]
[10,20,20,30,40]
[2,5,5,6,6,8]
[6,4,3,5,3]
[4,3,5,2,3]
[2,5,5,6,6,8]
[1,2,2,4,5,7,7,8,9]
[2,5,5,6,6,8]
[2,5,5,6,6,8]
[2.5,3.0,5.0]
["albert","jordi","josep"]
"aaaainntv"
```

Problem information

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