

# fn partition\_point\_mut

Michael Shoemate

September 5, 2025

## 1 Hoare Triple

### Precondition

#### Compiler-verified

Types consistent with pseudocode.

#### Caller-verified

- `x` must be partitioned by `pred`.
- `pred` may mutate its argument, but not change its true value used for comparisons.

### Pseudocode

```
1 def partition_point_mut(  
2     x: list[T],  
3     pred: Callable[[T], bool],  
4 ) -> usize:  
5     return binary_search_by_mut(x, lambda x_i: "less" if pred(x_i) else "greater")
```

### Postcondition

**Theorem 1.1.** Returns the index of the partition point according to the given predicate (the index of the first element of the second partition), or an error if the predicate fails.

*Proof.* By the postcondition of `binary_search_by_mut`, the return value is the index of the first element that changes the comparison from `Less` to `Greater`.

By the definition of the comparator, this is also the index of the first element of the second partition.  $\square$