



Specifications: AbstractGrade

In addition to the obvious specifications illustrated in the UML class diagram, the `AbstractGrade` class must satisfy the following specifications.

1. `AbstractGrade` objects must be immutable.
2. If a constructor is passed a key that is `null` or empty (i.e., `""`) then the constructor must throw an `IllegalArgumentException`.
3. The `compareTo(Grade other)` method must return the result of comparing `this.value` and `other.value` accounting for missing (i.e., `null`) values appropriately.
 - 3.1. If `this.value` is `null` and `other.value` is non-`null` then it must return `-1`.
 - 3.2. If `this.value` is `null` and `other.value` is `null` then it must return `0`.
 - 3.3. If `this.value` is non-`null` and `other.value` is `null` then it must return `1`.
 - 3.4. If both `this.value` and `other.value` are non-`null` then it must return the result of calling `compareTo()` on `this.value` and passing it `other.value` (though it need not be implemented this way).
4. The `toString()` method must return a `String` representation of the `AbstractGrade` object.
 - 4.1. If the `value` attribute is not `null` then the `String` must contain the key attribute, followed by the `String` literal `:"`, followed by a single space, followed by the `value` attribute (in a field of width 5 with 1 digit to the right of the decimal point).
 - 4.2. If the `value` attribute is `null` then the `String` must contain the key attribute, followed by the `String` literal `:"`, followed by a single space, followed by the `String` literal `"NA"` (right-justified in a field of width 5).