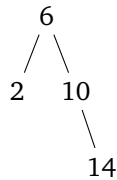


# Quickcheck 04: Solutions

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Name:

Consider the following AVL tree.



Give an example of a value you could insert to cause:

- (a) A single rotation

**Solution:**

Any value greater than 14 will cause a single rotation around 10 (since 10 will become unbalanced, but we'll be in the line case).

- (b) A double rotation

**Solution:**

Any value between 10 and 14 will cause a double rotation around 10 (since 10 will be unbalanced, and we'll be in the kink case).

- (c) No rotation

**Solution:**

Any value less than 10 will cause no rotation (since we can't cause any node to become unbalanced with those values).

Consider the following key-value pairs:

$(1, a), (4, b), (2, c), (17, d), (12, e), (9, e), (19, f), (4, g), (8, c), (12, f)$

- (a) Suppose we have a hash table implemented using separate chaining. This hash table has an internal capacity of 10. Its buckets are implemented using a linked list where new elements are appended to the end. Do not worry about resizing.

Show what this hash table internally looks like after inserting the above key-value pairs in the order given using the hash function  $h(x) = x$ .

**Solution:**

