5. [4 pts - 2 each] Demonstrate the constructivist definitions for each of the following:

(a) \(5 \times 3 = 15\) because \(5 + 5 + 5 = 15\).
(B) \(3 + 3 + 3 + 3 + 3 = 15\)

(b) \(5 - 3 = 2\) because \(2 + 3 = 5\)

6. (a) [5 pts] Is the set \(\{1, 3, 5, 7, \ldots\}\) closed under addition? Explain your response, referring to the meaning of this term.

No, it's not. We can add two numbers from this set, such as \(3 + 1\), and get an answer that's not in the set.

(b) [5 pts] What does it mean to say that an operation is associative? Give a supporting computational example.

It means that you can always regroup your numbers and still get the same answer.
Example: \(2 + (3 + 4) = (2 + 3) + 4\)

(c) [5 pts] Name an operation that is not commutative, giving a counterexample to support your claim.

Subtraction isn't because \(5 - 2 \neq 2 - 5\).
Division isn't because \(8 \div 4 \neq 4 \div 8\).

(d) [5 pts] What does it mean to say that a number is an identity for an operation? Give a supporting example.

It means that whenever you combine other numbers with that "identity," in any order, the other number is unchanged.
Example: \(0 + 2 = 2\) or \(1 + 0 = 1\)

7. [4 pts - 2 each] Name the property being demonstrated in each number sentence below:

(a) \((2 \cdot 3) \cdot 4 = 4 \cdot (2 \cdot 3)\) commutative

(b) \((1 + 2) \cdot 3 = 1 \cdot 3 + 2 \cdot 3\) distributive

8. [6 pts - 3 each] Write the three numbers that immediately precede each one below, in the given base.

(a) \(201_{four}\)
\(200, 133, 132\)

(b) \(T12_{twelve}\)
\(T11, T10, T0E\).