

Worksheet: Associativity and Commutativity

Recap:

A binary function f is *associative* if $f(f(x,y),z) = f(x,f(y,z))$.

A binary function f is *commutative* if $f(x,y) = f(y,x)$.

Worksheet problems:

1) Claim: a Finish Accumulator (FA) can only be used with operators that are *associative and commutative*. Why? What can go wrong with accumulators if the operator is non-associative or non-commutative?

2) For each of the following functions, indicate if it is associative and/or commutative.

a) $f(x,y) = x+y$, for integers x, y

b) $g(x,y) = (x+y)/2$, for integers x, y

c) $h(s1,s2) = \text{concat}(s1, s2)$ for strings $s1, s2$, e.g., $h(\text{"ab"}, \text{"cd"}) = \text{"abcd"}$

