

# Examples of formulas

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Trying to evaluate the complexity of formula... The Tree structures I propose are debatable. Also, I define complexity as a number of nodes, but it is not 100% clear how I should treat monadic functions as  $\sin a$ .

Formula	Tree	Complexity
$\sin a + \cos b$	$(+ (\sin a) (\sin b))$	3 (or 5) <sup>†</sup>
$\tan^{-1} b$	$(\operatorname{atan} b)$	1 (or 2) <sup>†</sup>
$\arctan b + c$	$(+ (\operatorname{atan} b) c)$	3 (or 4) <sup>†</sup>
$a + b + c + d$	$(+ a b c d)$	5?
$a \cdot \arctan b$	$(* a (\operatorname{atan} b))$	3 (or 4)
$(a + b)(c + d)$	$(* (+ a b) (+ c d))$	7?
$(ab) \sin(c)$	$(* (* a b) (\sin c))$	5 (or 6)
$2ab + b^2 c$	$(+ (*2 (* a b)) (* (**2 b) c))$	9
$e^{1-x^2}$	$(\exp (- (1 (**2 x))))$	5
$\frac{1}{x} + \frac{1}{y}$	$(+ (1/ x) (1/ y))$	5
$\frac{1}{x+y}$	$(1/ (+ x y))$	4
$\cos^2 \theta - \sin^2 \theta$	$(- (**2 (\cos a) (**2 (\sin a))))$	5
$\sqrt{1+x+x^2}$	$(\operatorname{sqrt} (+ 1 x (**2 x)))$	6
$\sqrt{1} + \sqrt{x} + \sqrt{x^2}$	$(+ (\operatorname{sqrt} 1) (\operatorname{sqrt} x) (\operatorname{sqrt} (**2 x)))$	6?

<sup>†</sup> Depending on whether we consider  $(\sin a)$  a single node or two nodes...

Other symbolic expressions...

$A \oplus (C \oplus D)$

$X \cup B \cap D$

$\int y dx$

$\forall x \in X, \exists y \leq \epsilon$