

How do you want me to simplify this?

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My (admittedly perverse) answer is that “to simplify” means to write an equivalent expression that the instructor/marker likely wants or expects as an answer. It is an exercise in mind-reading.

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Quick guide to simplifying

In the following, X matches any subexpression of the expression we are simplifying. The notation $X \rightarrow Y$ means to replace the subexpression X by Y .

- (a) Reduce all rational numbers to lowest terms.
- (b) All arithmetic sums, products, and exponents of numbers should be done.
- (c) All common additive and multiplicative terms should be combined.
- (d) Apply identities $1 \times X \rightarrow X$, $0 \times X \rightarrow 0$, $1^X \rightarrow 1$, and $X^1 \rightarrow X$.
- (e) Provided X is nonzero, apply identities $\frac{X}{X} \rightarrow 1$ and $X^0 = 1$.
- (f) Provided X is nonnegative, apply the identity $(X^a)^b \rightarrow X^{ab}$.
- (g) Use the values of the trigonometric functions at the integer multiples of $\pi/6$ and $\pi/4$ to simplify these values.
- (h) For any odd function O , replace $O(x) + O(-x)$ by zero.
- (i) For any even function E , replace $E(x) - E(-x)$ by zero.
- (j) Use the identities $\log(10^X) = X$ and $\ln(e^X) = X$ to replace the left side by the right side.
- (k) For a positive integer n , replace $\frac{1}{\sqrt{n}}$ by $\frac{\sqrt{n}}{n}$.
- (l) For a positive integers m and n , replace $\sqrt{mn^2}$ by $n\sqrt{m}$. An integer might need to be partially factored to put it into the form $m \times n^2$.