

Many of the mistakes which Calculus students make (and therefore many points lost on quizzes and tests) are a result of algebraic errors. The purpose of this problem set is to remind you of certain algebraic properties so that you will use these properties correctly throughout the semester.

Part I. Decide whether each of the following is always true or if it is false. In either case, justify your answer with an explanation or a numerical example. If a statement is false, write the correct statement if possible.

1. $5x^{-2} = \frac{1}{5x^2}$	2. $x(x+3)^2 = (x^2+3x)^2$
3. $\frac{3x^2(x+5) - x^3}{(x+5)^2} = \frac{3x^2 - x^3}{x+5}$	4. $\sqrt{x^2+4} = x+2$
5. $\frac{x}{\sqrt{x}} = \sqrt{x}$	6. If $x^2 \leq 9$, then $x \leq \pm 3$

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Part II. Solve each equation. Your answers should use exact values, that is, they should involve integers, fractions, or symbols such as e or $\sqrt{3}$, but not decimals.

7. $2x^2 - 3x - 1 = 0$	8. $2x^{1/2} - 8 = 0$
9. $\ln x = 3$	10. $e^x = 5$

Part III. Simplify each expression *as much as possible*. If the expression involves radicals, rewrite using exponents.

11. $\frac{(x+h)^2 - x^2}{h}$	12. $\frac{\frac{1}{x} - \frac{1}{3}}{x-3}$
13. $(x^3)^3\sqrt{x}$	14. $\frac{x^3}{\sqrt[3]{x^2}}$