Computer Algebra Systems Activity: Solving Linear Equations

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rollym@vaxxine.com

Topic: Solving Linear Equations

Notes to the Teacher:

a) This activity is designed to use the CAS on the TI-Nspire CAS calculator to enhance understanding and instruction. All screen shots are from the TI-Nspire CAS.

b) The instructions for the activity assume that the user has some elementary experience with a CAS. Novice users should complete the activity Computer Algebra Systems: An Introduction before attempting this activity.

c) The activity is presented in a **Teacher Version**, with all screen shots and solutions present, as well as a **Student Version**, which can be duplicated and handed out to students.

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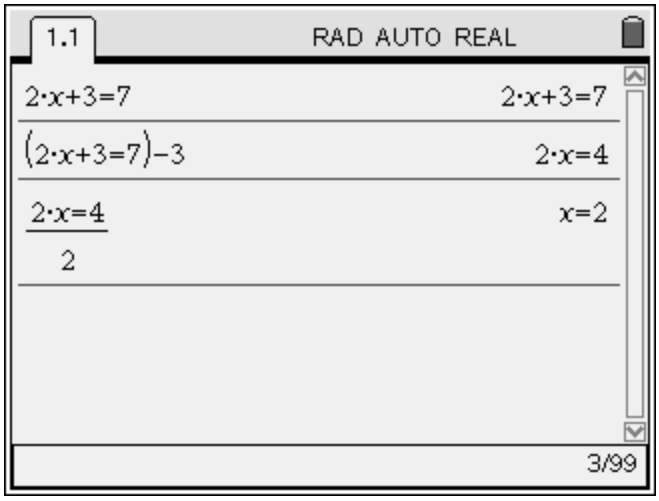
Teacher Version:

Introduction: Computer Algebra Systems contain powerful algorithms for solving equations. These may have a numerical solution, such as $2x + 3 = 7$, solve for x, or they may result in a rearranged "formula", such as $C = 2\pi r$, solve for r. CAS can handle both of these.

1. To begin, you will use CAS to solve $2x + 3 = 7$ in a stepwise fashion. Turn on your TI-Nspire CAS, and enter the equation.

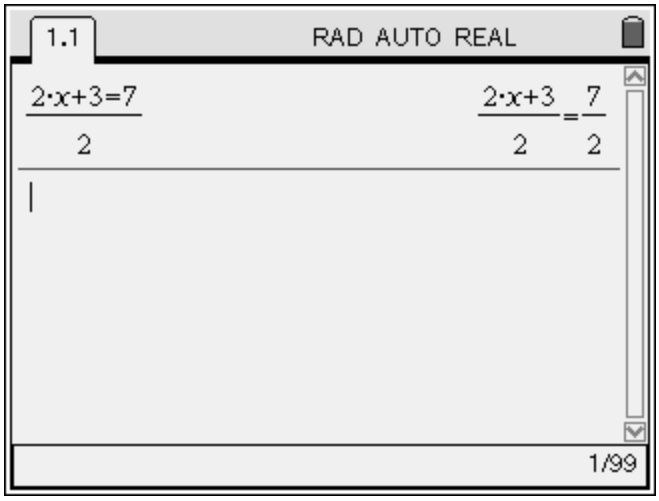


The first step in the solution is to subtract 3 from both sides. Do this.

The next step in the solution is to divide both sides of the equation by 2. Do this.

Note the correct solution.
[Answer: $x = 2$]

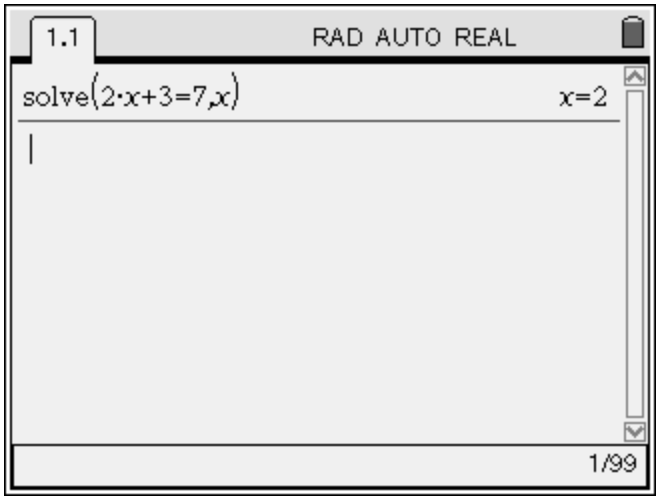
2. When using a CAS to solve an equation in a step-wise fashion, you need to know the correct steps to follow. If you instruct the CAS with an incorrect step, it will perform the action that you asked for, but it will become obvious that you have made an error. To see how this works, enter the equation again.



Let's assume that you make an error, and decide that the correct first step in the solution is to divide both sides by 2. Insert brackets around the equation, and divide by 2.

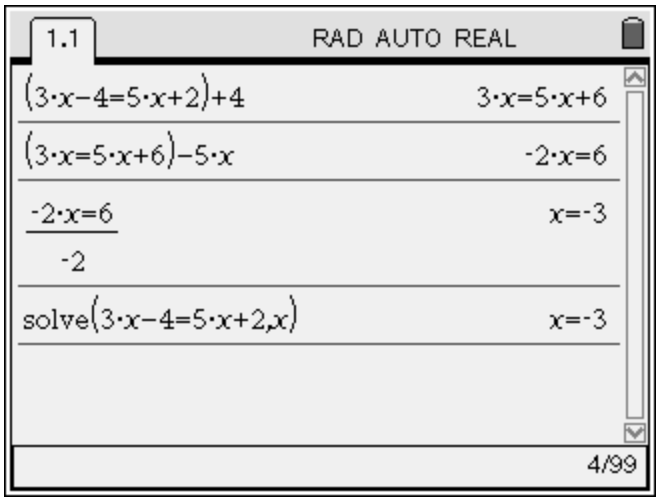
Note that both sides of the equation have become more complicated. It is not at all obvious where to go from here.

3. The CAS can also solve the equation for you automatically. Clear your work area. Press **menu**, select **3:Algebra** and select option **1: Solve**. Enter the equation, followed by a comma, and then an *x*. Press **enter**. Note that CAS has solved for *x* automatically.

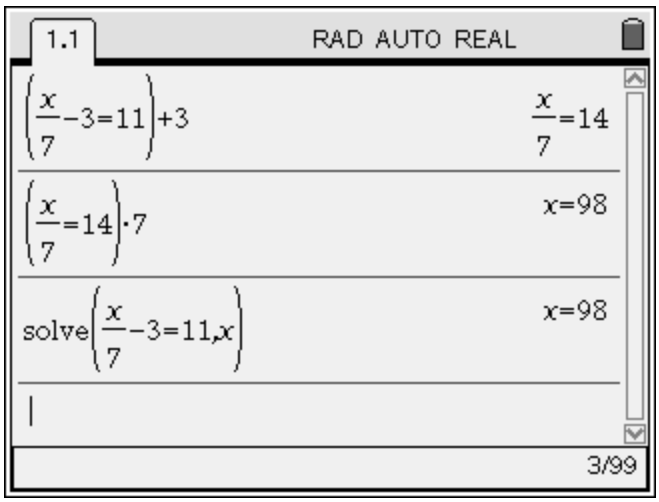


4. Use a CAS to solve the following equations. Solve each one first in a step-wise fashion, and then use the **Solve** function.

a) $3x - 4 = 5x + 2$

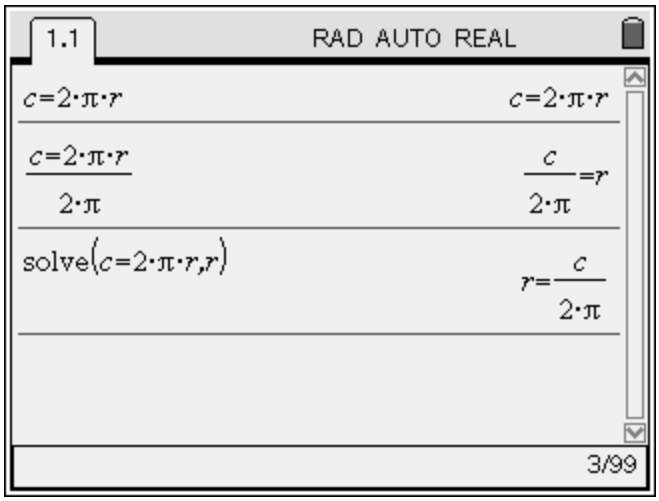


b) $\frac{x}{7} - 3 = 11$

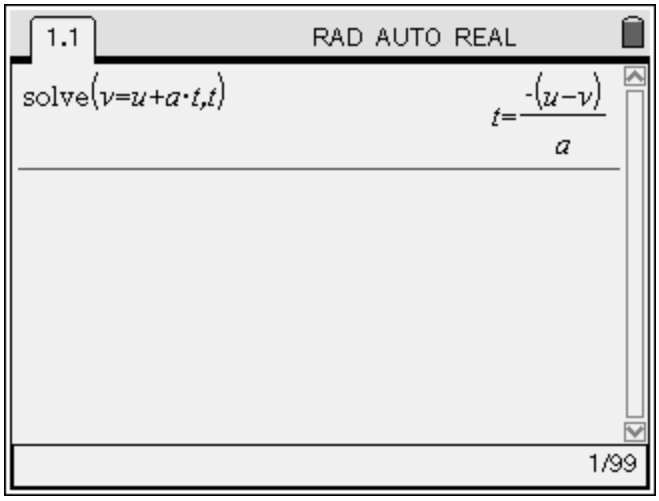


5. A CAS can also solve equations that include several variables, such as $C = 2\pi r$. To solve for r, divide both sides by 2π.

Now, use the **Solve** function to solve for r.

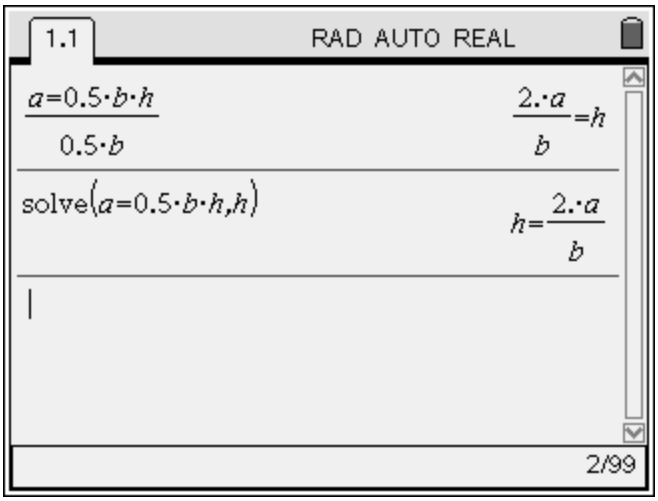


Try a more complicated formula, such as $v = u + at$. Solve for u. Then, solve for t.

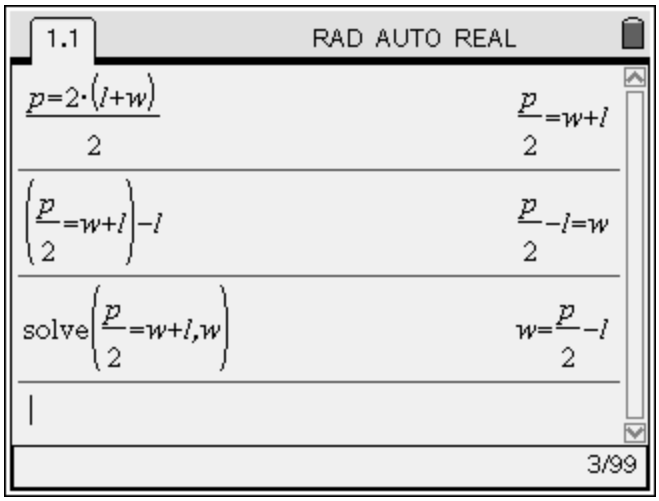


6. Solve each of the following for the variable indicated. Use a step-wise solution, and then the **Solve** function.

a) Solve $A = \frac{1}{2}bh$ for h.



b) Solve $P = 2(l + w)$ for w.



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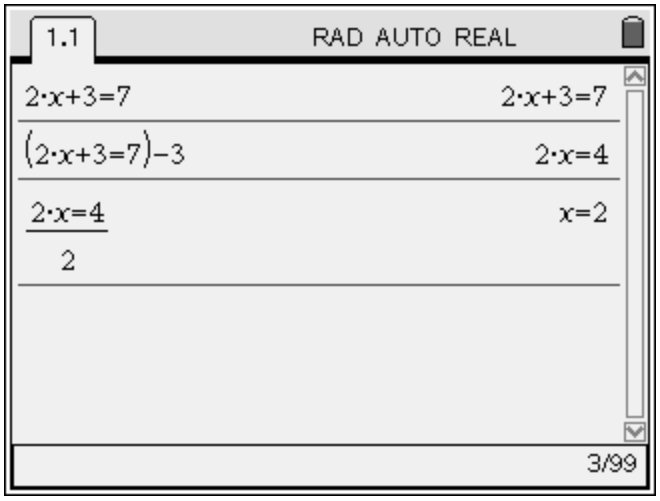

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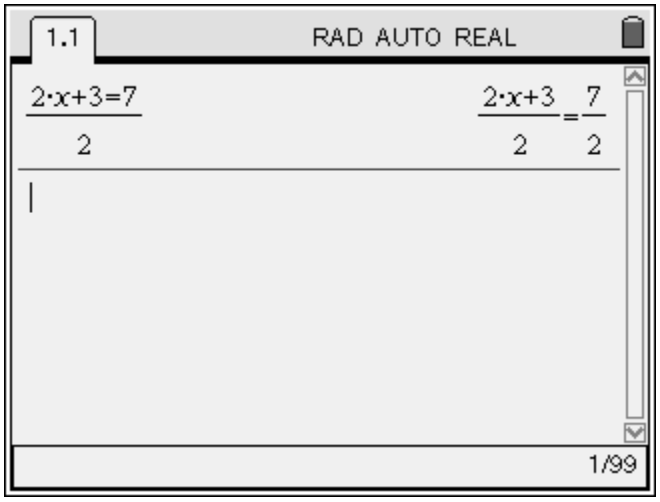

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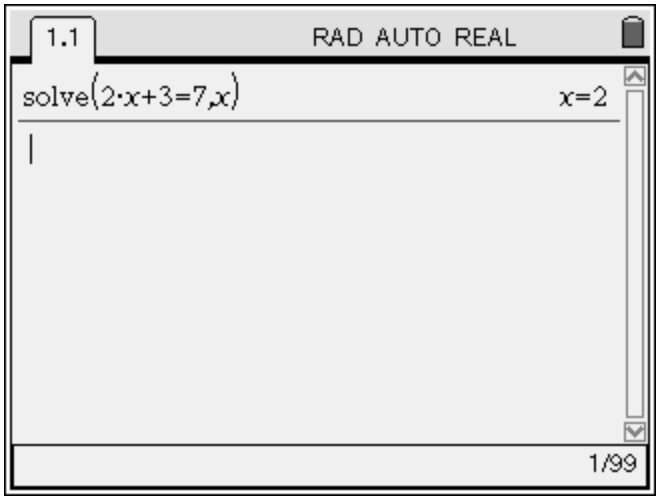

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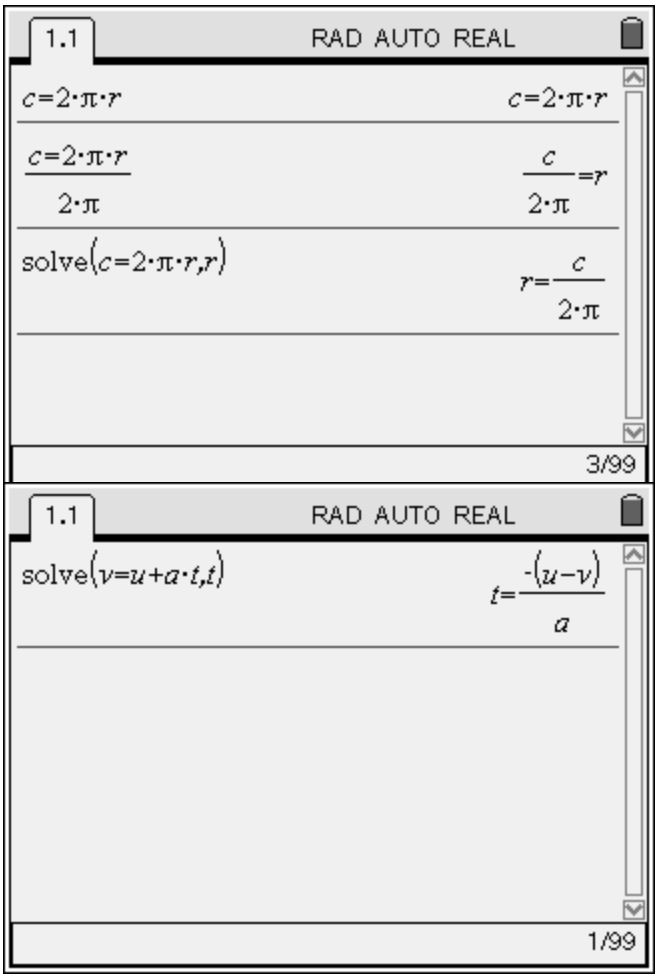

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