HW #1-4 on algorithm correctness

1. Write an algorithm for solving a linear system by substitution.

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| **Input**  A pair of equations of the form:  *y = Ax + B*  *y = Cx + D*  where *A, B, C* and *D* can be any four numbers.  (Example, if *y* = 2*x* -5 and *y* = -7*x*,  then *A*=2, *B*=-5, *C*=-7 and *D*=0) | **Output**  EITHER:   * The statement “*No solution, because the lines are parallel*” * OR the statement “*Infinitely many solutions, because the two lines are the same*.” * OR the solution to the system if neither of the above is true. This part should be a formula in terms of A, B, C and D. |
| **Algorithm** | |

2. Solve the linear system   
 y = 2x + 5  
 y = -x + 14  
  
 in two ways. First, solve it by hand using the subsitution method you learned in Grade 10.  
 Second, solve it using the formula you developed in problem #1 above.

3. Below is an algorithm for finding the slope of a line perpendicular to a given line. Is it always correct? Can you find an example input for which it fails?

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| Input: **A line in standard form  Ax + By + C = 0** | Output: **The slope of any line perpendicular to the given line** |
| Algorithm  **Find the slope of the given line (***assume our robot already know how to do this***)**  **Let *s* = that slope**  **Let *r* = -1/*s***  **Output “The perpendicular slope is ” *r*** | |
| Example input on which this algorithm fails:  Fix the algorithm so that this doesn’t happen | |