Quick Algebra Problem Generator

The sections below outline the steps for creating your own Algebra Problem Generator. You only need to write the code once and then modify it directly. Copy and paste different versions for quick reference later.

DRAFT

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step 1 - note "a" starts at 1 to avoid errors later

```
a = RandomInteger[{1, 10}];
b = RandomInteger[{0, 10}];
c = RandomInteger[{0, 10}];
a * x + b * y == c
```

$7\,x + 5\,y == 4$

---

step 2 - include Solve (note defining "prob")

```
a = RandomInteger[{1, 10}];
b = RandomInteger[{0, 10}];
c = RandomInteger[{0, 10}];
prob = (a * x + b * y == c)
Solve[prob, x]
```

$2\,x + 3\,y == 10$

$$\left\{\left\{x \to \frac{1}{2}\,(10 - 3\,y)\right\}\right\}$$

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step 3 - Make prob and solve a list

```
a = RandomInteger[{1, 10}];
b = RandomInteger[{0, 10}];
c = RandomInteger[{0, 10}];
{prob = (a * x + b * y == c),
 Solve[prob, x]}
```

$\{6\,x + 6\,y == 0,\ \{\{x \to -y\}\}\}$

step 4 - make it a Table to generate 5 (or whatever) probs

```
Table[
 a = RandomInteger[{1, 10}];
 b = RandomInteger[{0, 10}];
 c = RandomInteger[{0, 10}];
 {prob = (a * x + b * y == c),
  Solve[prob, x]},
 {5}]
```

$$\left\{\left\{8\,x == 6,\ \left\{\left\{x \to \frac{3}{4}\right\}\right\}\right\},\ \left\{6\,x + 7\,y == 2,\ \left\{\left\{x \to \frac{1}{6}\,(2 - 7\,y)\right\}\right\}\right\},\ \{x + 2\,y == 0,\ \{\{x \to -2\,y\}\}\},\right.$$
$$\left.\left\{4\,x + y == 2,\ \left\{\left\{x \to \frac{2 - y}{4}\right\}\right\}\right\},\ \left\{9\,x + 10\,y == 1,\ \left\{\left\{x \to \frac{1}{9}\,(1 - 10\,y)\right\}\right\}\right\}\right\}$$

step 5 - make it look nice

```
TraditionalForm@TableForm@Table[
   a = RandomInteger[{1, 10}];
   b = RandomInteger[{0, 10}];
   c = RandomInteger[{0, 10}];
   {prob = (a * x + b * y == c),
    Solve[prob, x]},
   {5}]
```

$x + 8\,y = 5$	$x \to 5 - 8\,y$
$8\,x + 10\,y = 10$	$x \to -\frac{5}{4}\,(y - 1)$
$4\,x + 6\,y = 6$	$x \to -\frac{3}{2}\,(y - 1)$
$10\,x = 10$	$x \to 1$
$2\,x + 5\,y = 4$	$x \to \frac{1}{2}\,(4 - 5\,y)$

(if desired/asked) step 6 - change arrow to =

```
TraditionalForm@TableForm@Table[
   a = RandomInteger[{1, 10}];
   b = RandomInteger[{0, 10}];
   c = RandomInteger[{0, 10}];
   {prob = (a * x + b * y == c), "   ",
    Row[{x, " = ", x /. Flatten@Solve[prob, x]}]},
   {5}]
```

$7x+4y=7$ $x=\frac{1}{7}(7-4y)$

$10x+8y=4$ $x=-\frac{2}{5}(2y-1)$

$2x+10y=6$ $x=3-5y$

$7x+3y=5$ $x=\frac{1}{7}(5-3y)$

$7x+y=9$ $x=\frac{9-y}{7}$

adjust problem to make it quadratic

note: Options for TableForm are just options to make it look nicer.

```
TraditionalForm@TableForm[Table[
   a = RandomInteger[{1, 10}];
   b = RandomInteger[{0, 10}];
   c = RandomInteger[{0, 10}];
   {prob = (a * x^2 + b * x == c),
    Solve[prob, x]},
   {3}], TableAlignments → {Left, Top}, TableSpacing → 4]
```

$7x^2+3x=3$

$x\to\frac{1}{14}\left(-3-\sqrt{93}\right)$

$x\to\frac{1}{14}\left(-3+\sqrt{93}\right)$

$9x^2+7x=10$

$x\to\frac{1}{18}\left(-7-\sqrt{409}\right)$

$x\to\frac{1}{18}\left(-7+\sqrt{409}\right)$

$3x^2+7x=5$

$x\to\frac{1}{6}\left(-7-\sqrt{109}\right)$

$x\to\frac{1}{6}\left(-7+\sqrt{109}\right)$

factorable quadratic equations

```
TraditionalForm@TableForm[Table[
   a = RandomInteger[{1, 10}];
   b = RandomInteger[{0, 10}];
   c = RandomInteger[{0, 10}];
   {prob = (Expand[a (x + b) (x - c)] == 0),
    Solve[prob, x]},
   {3}], TableAlignments → {Left, Top}, TableSpacing → 4]
```

$10\,x^2 - 10\,x - 900 = 0$	$x \to -9$ $x \to 10$
$3\,x^2 + 24\,x - 60 = 0$	$x \to -10$ $x \to 2$
$7\,x^2 - 7\,x = 0$	$x \to 0$ $x \to 1$

change to factoring/expanding problem and soln

note change in a, b, and c

```
TraditionalForm@TableForm@Table[
   a = RandomInteger[{-10, 10}];
   b = RandomInteger[{0, 10}];
   c = RandomInteger[{1, 3}];
   {prob = (x + a) (x + b) * c,
    Expand[prob]},
   {5}]
```

$3\,(x-1)\,(x+6)$	$3\,x^2 + 15\,x - 18$
$3\,(x+4)\,(x+5)$	$3\,x^2 + 27\,x + 60$
$3\,(x-10)\,(x+9)$	$3\,x^2 - 3\,x - 270$
$(x-3)\,(x+10)$	$x^2 + 7\,x - 30$
$(x+6)\,(x+10)$	$x^2 + 16\,x + 60$

systems

change problem to list
add variables
change solve to {x,y}

```
TraditionalForm@TableForm[Table[
   a = RandomInteger[{1, 10}];
   b = RandomInteger[{0, 10}];
   c = RandomInteger[{0, 10}];
   d = RandomInteger[{1, 10}];
   e = RandomInteger[{0, 10}];
   f = RandomInteger[{0, 10}];
   {prob = ({a * x + b * y == c, d * x + e * y == f}),
    Solve[prob, {x, y}]},
   {5}], TableSpacing → 4]
```

$x + y = 4$
$4x + 5y = 1$ $\quad x \to 19 \quad y \to -15$

$2x + y = 2$
$10x + 7y = 2$ $\quad x \to 3 \quad y \to -4$

$x + 7y = 2$
$3x + 4y = 0$ $\quad x \to -\frac{8}{17} \quad y \to \frac{6}{17}$

$7x + y = 2$
$4x + 6y = 3$ $\quad x \to \frac{9}{38} \quad y \to \frac{13}{38}$

$5x + 9y = 10$
$9x = 7$ $\quad x \to \frac{7}{9} \quad y \to \frac{55}{81}$

Author Information

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