**Harder Simultaneous equations**

**1.** Solve and for and .

Let , by (2) .

Substitute in (1),

.

**2.** Solve

Put

Then .

The system of equations become

From (5),

From (4),

From (6) and (4), are roots of

(a)

(b)

Since (1),(2) is symmetric in , the solutions are

.

**3.** Solve the system, where ?

First we solve (1) and (2) by rewriting as:

(i)

(ii)

From (4),

(i) If , substitute in (1),

Note that the equation is satisfied for .

(ii) If , from (6), is a free variable.

Substitute in

Similarly we can solve (2), (3) and substitute in (1) or solve (3), (1) and substitute in (2).

Complete solution: **.**

**4.** If and, then what is equal to?

The coefficient determinant of is zero.

In order the system to have solution, there must be a free valuable.

Let this be , and interestingly, can be any value you like.

For simplicity, put .

(1) and (2) becomes

Solving, .

**5.** Solve

**Method 1**

Put . The system of equation becomes

From (1),

.

Since

(6)(5),

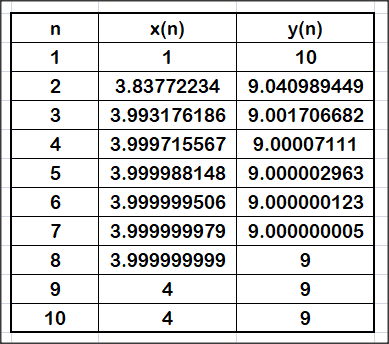
Since

is the only answer.

**Method 2 Numerical method**

We set up our iterative formula,

We choose from (1), .

 From (2),

From (1),

Continue in this way:

1/6/2020

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