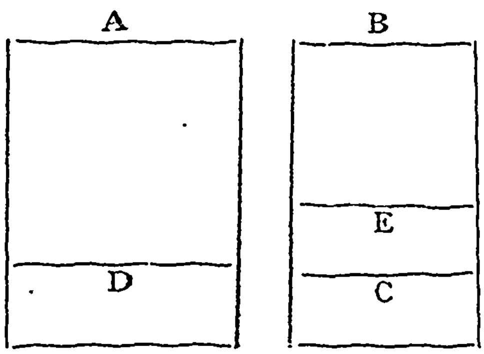
$$= 2\left(1 - \frac{x}{4}\right) \therefore x = 3\tfrac{1}{3}.$$

(2) Let A, B be the two cisterns, A being emptied in 4 hours and B in 5 hours. Let C be the quantity of water remaining in B when A is just emptied, C is therefore one-fifth of B. Also when B contains twice as much as A let D be the quantity in A, and C + E the quantity in B.



Now since D and E are emptied in the same time $\therefore$ D : E as 5 : 4; also D : C + E as 5 : 10; $\therefore$ E : C as 4 : 6, $\therefore$ E + C $= \frac{5}{3}$C, and C $= \frac{1}{5}$B, $\therefore$ E+C $= \frac{1}{3}$B, $\therefore$ B is $\frac{2}{3}$ empty at time required, consequently the required result is $\frac{2}{3}$ of 5 hours.

4. Find x and y from the equations:

$$x^2 + y = 7$$
$$x + y^2 = 11$$

It is evident that one solution gives $x = 2$, $y = 3$.

The other three pairs of values are obtained by cubic equations and are:

(1) $x = 3.131312$, $y = 3.584428$.
(2) $x = -1.848126$, $y = -2.805118$.
(3) $x = -3.283186$, $y = -3.779310$.

5. A clock is half an hour slow at noon and is gaining at the rate of a minute per hour, find the true time when the hands are together between six and seven, p. m.

At 12 o'clock the clock indicates 11.30, therefore at 7 o'clock the clock will indicate 6.37, and when the hands are together the clock indicates $6.32\frac{8}{11}$, which is $4\frac{3}{11}$ minutes (by the clock) before it indicates 6.37, $\therefore$ the true time when the hands are together is $\frac{60}{61}$ of $4\frac{3}{11}$ minutes before 7 o'clock, or $6.55\frac{135}{671}$ p. m.

6. A man undertakes to pile up the stones and pull out the stumps in a field at the rate of 10 cents a score for the stones and 25 cents a piece for the stumps. One stump occupies him as long as 40 stones. He works three days and earns \$8, then goes on at the same rate of working and finishes the job in $3\frac{3}{4}$ days more, and earns altogether \$20. How many stumps and stones were there in the field?

If he had worked at stumps and stones in the same proportion during the second period as during the first he would have earned only \$10, therefore he must have substituted stumps for stones to such an extent as to earn \$2 more without increasing the rate of working. Every time he pulls a stump instead of 40 stones he earns 5 cents more, therefore to earn \$2 more he must substitute 40 stumps for 1600 stones, and to render this possible he must have picked up at least 1600 stones the first 3 days; but as 1600 stones would bring him \$8 he could not have done more than 1600 stones the first 3 days, and if he could pick up 1600 stones in 3 days, he could, in $3\frac{3}{4}$ days, pick up 2000, but for 1600 of these he substitutes 40 stumps, $\therefore$ there were 40 stumps and 2000 stones.