```
Clear["`*"];
(*This command on line 1 is very useful. Clears all symbols from previous runs.*)
iv1 = a[0] == 0;
iv2 = a[1] == 0;
(* iv1 and iv2 are the initial values*)
(* rr is the recurrence relation (RR). Note ==  *)
rr = a[n] == a[n - 1] + a[n - 2] + (2^(n - 2));
(* In this example the RR is second order and non-homogeneous*)
sol = RSolve[{rr, iv1, iv2}, a[n], n] // Simplify
(* RSolve solves the RR. For differential equations you call for DSolve.
   Do you wonder what // and Simplify means? Select
  them with mouse and click on "Find Selected Function" in Help *)
a[n_] = a[n] /. sol[[1]];
(* The last line looks strange. /.
 means Replace All. The function a[n] is defined from the solution sol in
  this way. sol is a list and [[1]] picks out the first
  element in this list (there is only one element here).*)
(* If you want to run the program then press Shift +
 Enter at the end of the last line *)
Print[a[2], "   ", a[3], "   ", a[4], "   ", a[5]]
Print[a[50]]
(* The program use the Fibonacci and Lucas numbers to express the solution *)
```

$$\left\{\left\{a[n] \to 2^n - \frac{3\,\text{Fibonacci}[n]}{2} - \frac{\text{LucasL}[n]}{2}\right\}\right\}$$

```
1   3   8   19

1 125 866 955 562 525
```