In[•]:=
```
ourFib[1] = 1; ourFib[2] = 1;
ourFib[n_] := ourFib[n - 1] + ourFib[n - 2]

phi = (1 + Sqrt[5]) / 2;
psi = (1 - Sqrt[5]) / 2;
fastFib[n_] := FullSimplify[(phi^n - psi^n) / (phi - psi)]

table = TableForm[
  Table[
   {
    n,
    ourFib[n],
    Timing[ourFib[n]][[1]],
    fastFib[n],
    Timing[fastFib[n]][[1]],
    Fibonacci[n],
    Timing[Fibonacci[n]][[1]]
   },
   {n, 1, 34}
  ],
  TableHeadings → {None, {
     "n",
     "ourFib[n]",
     "ourFib[] timing",
     "fastFib[n]",
     "fastFib[] timing",
     "Fibonacci[n]",
     "Fibonacci[] timing"}},
  TableAlignments → Center
 ]
```

Out[•]//TableForm=

n	ourFib[n]	ourFib[] timing	fastFib[n]	fastFib[] timing	Fibonacci[n]	Fi
1	1	0.	1	0.	1	
2	1	0.	1	0.	1	
3	2	0.	2	0.	2	
4	3	0.	3	0.	3	
5	5	0.	5	0.	5	
6	8	0.	8	0.	8	
7	13	0.	13	0.	13	
8	21	0.	21	0.	21	
9	34	0.	34	0.	34	
10	55	0.	55	0.	55	
11	89	0.	89	0.	89	
12	144	0.	144	0.	144	
13	233	0.	233	0.	233	
14	377	0.	377	0.	377	
15	610	0.	610	0.	610	
16	987	0.	987	0.	987	
17	1597	0.	1597	0.	1597	
18	2584	0.	2584	0.	2584	
19	4181	0.015625	4181	0.	4181	
20	6765	0.015625	6765	0.	6765	
21	10 946	0.015625	10 946	0.	10 946	
22	17 711	0.015625	17 711	0.	17 711	
23	28 657	0.015625	28 657	0.	28 657	
24	46 368	0.03125	46 368	0.	46 368	
25	75 025	0.0625	75 025	0.	75 025	
26	121 393	0.078125	121 393	0.	121 393	
27	196 418	0.0625	196 418	0.	196 418	
28	317 811	0.21875	317 811	0.	317 811	
29	514 229	0.265625	514 229	0.	514 229	
30	832 040	0.453125	832 040	0.	832 040	
31	1 346 269	0.859375	1 346 269	0.	1 346 269	
32	2 178 309	1.48438	2 178 309	0.	2 178 309	
33	3 524 578	2.32813	3 524 578	0.	3 524 578	
34	5 702 887	3.5625	5 702 887	0.	5 702 887	

In[•]:=
```
Export["C:\\Users\\brijk\\OneDrive\\Desktop\\some homework\\table.pdf", table]
```

Out[•]=

C:\Users\brijk\OneDrive\Desktop\some homework\table.pdf

In[•]:=
```
F[x_] := x / (1 - x - x^2)
```

In[•]:=
```
array = TableForm[
  Table[
   {n,
    TraditionalForm@Simplify[D[F[x], {x, n}]],
    (D[F[x], {x, n}] /. x → 0) / n!
   },
   {n, 0, 11}
  ]
 ]
```

Out[•]//TableForm=

0	$-\frac{x}{x^2+x-1}$	0
1	$\frac{x^2+1}{\left(x^2+x-1\right)^2}$	1
2	$-\frac{2\left(x^3+3x+1\right)}{\left(x^2+x-1\right)^3}$	1
3	$\frac{6\left(x^4+6x^2+4x+2\right)}{\left(x^2+x-1\right)^4}$	2
4	$-\frac{24\left(x^5+10x^3+10x^2+10x+3\right)}{\left(x^2+x-1\right)^5}$	3
5	$\frac{120\left(x^6+15x^4+20x^3+30x^2+18x+5\right)}{\left(x^2+x-1\right)^6}$	5
6	$-\frac{720\left(x^7+21x^5+35x^4+70x^3+63x^2+35x+8\right)}{\left(x^2+x-1\right)^7}$	8
7	$\frac{5040\left(x^8+28x^6+56x^5+140x^4+168x^3+140x^2+64x+13\right)}{\left(x^2+x-1\right)^8}$	13
8	$-\frac{40\,320\left(x^9+36x^7+84x^6+252x^5+378x^4+420x^3+288x^2+117x+21\right)}{\left(x^2+x-1\right)^9}$	21
9	$\frac{362\,880\left(x^{10}+45x^8+120x^7+420x^6+756x^5+1050x^4+960x^3+585x^2+210x+34\right)}{\left(x^2+x-1\right)^{10}}$	34
10	$-\frac{3\,628\,800\left(x^{11}+55x^9+165x^8+660x^7+1386x^6+2310x^5+2640x^4+2145x^3+1155x^2+374x+55\right)}{\left(x^2+x-1\right)^{11}}$	55
11	$\frac{39\,916\,800\left(x^{12}+66x^{10}+220x^9+990x^8+2376x^7+4620x^6+6336x^5+6435x^4+4620x^3+2244x^2+660x+89\right)}{\left(x^2+x-1\right)^{12}}$	89

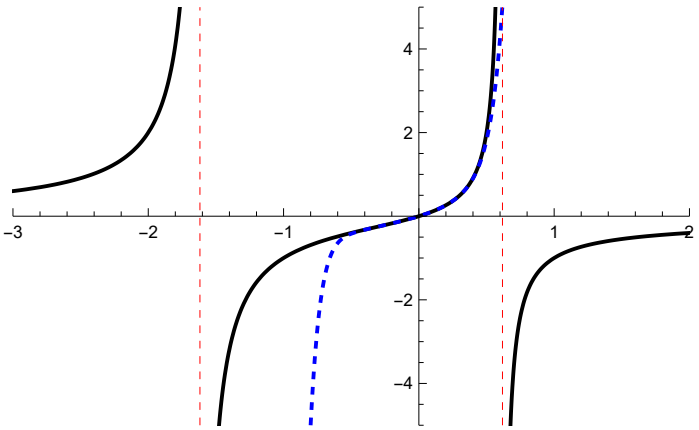
In[•]:=
```
TeXForm[array]
```

Out[•]//TeXForm=
```
\begin{array}{ccc}
 0 & -\frac{x}{x^2+x-1} & 0 \\
 1 & \frac{x^2+1}{\left(x^2+x-1\right)^2} & 1 \\
 2 & -\frac{2 \left(x^3+3
   x+1\right)}{\left(x^2+x-1\right)^3} & 1 \\
 3 & \frac{6 \left(x^4+6 x^2+4
   x+2\right)}{\left(x^2+x-1\right)^4} & 2 \\
 4 & -\frac{24 \left(x^5+10 x^3+10 x^2+10
   x+3\right)}{\left(x^2+x-1\right)^5} & 3 \\
 5 & \frac{120 \left(x^6+15 x^4+20 x^3+30 x^2+18
   x+5\right)}{\left(x^2+x-1\right)^6} & 5 \\
 6 & -\frac{720 \left(x^7+21 x^5+35 x^4+70 x^3+63
   x^2+35 x+8\right)}{\left(x^2+x-1\right)^7} & 8
   \\
 7 & \frac{5040 \left(x^8+28 x^6+56 x^5+140 x^4+168
   x^3+140 x^2+64
   x+13\right)}{\left(x^2+x-1\right)^8} & 13 \\
 8 & -\frac{40320 \left(x^9+36 x^7+84 x^6+252
   x^5+378 x^4+420 x^3+288 x^2+117
   x+21\right)}{\left(x^2+x-1\right)^9} & 21 \\
 9 & \frac{362880 \left(x^{10}+45 x^8+120 x^7+420
   x^6+756 x^5+1050 x^4+960 x^3+585 x^2+210
   x+34\right)}{\left(x^2+x-1\right)^{10}} & 34 \\
 10 & -\frac{3628800 \left(x^{11}+55 x^9+165
   x^8+660 x^7+1386 x^6+2310 x^5+2640 x^4+2145
   x^3+1155 x^2+374
   x+55\right)}{\left(x^2+x-1\right)^{11}} & 55 \\
 11 & \frac{39916800 \left(x^{12}+66 x^{10}+220
   x^9+990 x^8+2376 x^7+4620 x^6+6336 x^5+6435
   x^4+4620 x^3+2244 x^2+660
   x+89\right)}{\left(x^2+x-1\right)^{12}} & 89 \\
\end{array}
```

In[•]:=
```
VA = Solve[Denominator@F[x] == 0];
```

In[•]:=
```
graph = Plot[
  {F[x],
   Evaluate@Normal@Series[F[x], {x, 0, 11}]},
  {x, -3, 2},
  PlotRange → {{-3, 2}, {-5, 5}},
  PlotStyle → {{Black, Automatic}, {Blue, Dashed}},
  Epilog → {Dashed, Red,
    InfiniteLine[{x, 0}, {0, 1}] /. VA
   }
 ]
```

Out[•]=



In[•]:=
```
Export["C:\\Users\\brijk\\OneDrive\\Desktop\\some homework\\graph.pdf", graph]
```

Out[•]=

C:\Users\brijk\OneDrive\Desktop\some homework\graph.pdf