Serie

In[1]:=

```
seriesin = Table[Series[Sin[x],{x,0,i}],{i,0,14}];
MatrixForm[seriesin]
```

Out[2]//MatrixForm=

$$O[x]^1$$

$$x + O[x]^2$$

$$x + O[x]^3$$

$$x - \frac{x^3}{6} + O[x]^4$$

$$x - \frac{x^3}{6} + O[x]^5$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} + O[x]^6$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} + O[x]^7$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + O[x]^8$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + O[x]^9$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} + O[x]^{10}$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} + O[x]^{11}$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800} + O[x]^{12}$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800} + O[x]^{13}$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800} + \frac{x^{13}}{6227020800} + O[x]^{14}$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800} + \frac{x^{13}}{6227020800} + O[x]^{15}$$

In[3]:=

```
polinomisin = Normal[seriesin]
```

Out[3]=

$$\left\{0, x, x, x - \frac{x^3}{6}, x - \frac{x^3}{6}, x - \frac{x^3}{6} + \frac{x^5}{120}, x - \frac{x^3}{6} + \frac{x^5}{120},\right.$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040}, x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040},$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880}, x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880},$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800},$$

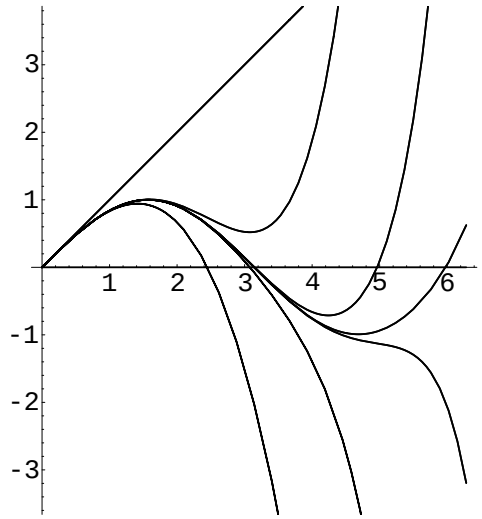
$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800},$$

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800} + \frac{x^{13}}{6227020800},$$

$$\left.x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800} + \frac{x^{13}}{6227020800}\right\}$$

In[4]:=

```
Plot[polinomisin//Evaluate,{x,0,2Pi},AspectRatio->Automatic]
```



Out[4]=

-Graphics-

In[5]:=

```
MatrixForm[Table[N[polinomisin[[i]],4],{x,0,Pi/2,Pi/32},{i,2,15,2}]]
```

Out[5]//MatrixForm=

0	0	0	0	0	0	0
0.09817	0.09802	0.09802	0.09802	0.09802	0.09802	0.09802
0.1963	0.1951	0.1951	0.1951	0.1951	0.1951	0.1951
0.2945	0.2903	0.2903	0.2903	0.2903	0.2903	0.2903
0.3927	0.3826	0.3827	0.3827	0.3827	0.3827	0.3827
0.4909	0.4712	0.4714	0.4714	0.4714	0.4714	0.4714
0.589	0.555	0.5556	0.5556	0.5556	0.5556	0.5556
0.6872	0.6331	0.6344	0.6344	0.6344	0.6344	0.6344
0.7854	0.7047	0.7071	0.7071	0.7071	0.7071	0.7071
0.8836	0.7686	0.7731	0.773	0.773	0.773	0.773
0.9817	0.824	0.8316	0.8315	0.8315	0.8315	0.8315
1.08	0.87	0.8823	0.8819	0.8819	0.8819	0.8819
1.178	0.9056	0.9245	0.9239	0.9239	0.9239	0.9239
1.276	0.9298	0.958	0.9569	0.9569	0.9569	0.9569
1.374	0.9417	0.9826	0.9807	0.9808	0.9808	0.9808
1.473	0.9404	0.9981	0.9951	0.9952	0.9952	0.9952
1.571	0.9248	1.005	0.9998	1.	1.	1.

In[6]:=

```
MatrixForm[Table[N[{polinomisin[[15]],Sin[x]},20],{x,0,Pi/2,Pi/32}]]
```

Out[6]//MatrixForm=

0	0
0.098017140329560601994	0.098017140329560601994
0.19509032201612826785	0.19509032201612826785
0.29028467725446236764	0.29028467725446236764
0.38268343236508977235	0.38268343236508977173
0.47139673682599766624	0.47139673682599764856
0.55557023301960249715	0.55557023301960222474
0.63439328416364824747	0.63439328416364549822
0.70710678118656788846	0.70710678118654752440
0.77301045336285605511	0.77301045336273696081
0.83146961230312328188	0.83146961230254523708
0.88192126435076787429	0.88192126434835502971
0.92387953252017886540	0.92387953251128675613
0.95694033576172455310	0.95694033573220886494
0.98078528049285133680	0.98078528040323044913
0.99518472692420427140	0.99518472667219688624
1.00000000662780090000	1.

In[7]:=

```
poli30 = Normal[Series[Sin[x],{x,0,30}]]
```

Out[7]=

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800} + \frac{x^{13}}{6227020800} - \frac{x^{15}}{1307674368000} + \frac{x^{17}}{355687428096000} - \frac{x^{19}}{121645100408832000} + \frac{x^{21}}{51090942171709440000} - \frac{x^{23}}{25852016738884976640000} + \frac{x^{25}}{15511210043330985984000000} - \frac{x^{27}}{10888869450418352160768000000} + \frac{x^{29}}{8841761993739701954543616000000}$$

In[8]:=

```
poli30 = N[poli30]
```

Out[8]=

$$x - 0.166667\, x^3 + 0.00833333\, x^5 - 0.000198413\, x^7 + 2.75573\, 10^{-6}\, x^9 - 2.50521\, 10^{-8}\, x^{11} + 1.6059\, 10^{-10}\, x^{13} - 7.64716\, 10^{-13}\, x^{15} + 2.81146\, 10^{-15}\, x^{17} - 8.22064\, 10^{-18}\, x^{19} + 1.95729\, 10^{-20}\, x^{21} - 3.86817\, 10^{-23}\, x^{23} + 6.44695\, 10^{-26}\, x^{25} - 9.18369\, 10^{-29}\, x^{27} + 1.131\, 10^{-31}\, x^{29}$$

In[9]:=

```
MatrixForm[Table[N[{poli30,Sin[x]}],20],{x,0,Pi/2,Pi/32}]]
```

Out[9]//MatrixForm=

0	0
0.0980171403295606	0.09801714032956060 1994
0.1950903220161282	0.19509032201612826785
0.2902846772544623	0.29028467725446236764
0.3826834323650898	0.38268343236508977173
0.4713967368259977	0.47139673682599764856
0.5555702330196022	0.55557023301960222474
0.6343932841636456	0.63439328416364549822
0.7071067811865475	0.707106781186547524 4
0.7730104533627369	0.77301045336273696081
0.831469612302545	0.83146961230254523708
0.881921264348355	0.88192126434835502971
0.923879532511287	0.92387953251128675613
0.956940335732209	0.95694033573220886494
0.98078528040323	0.98078528040323044913
0.995184726672197	0.99518472667219688624
1.	1.