

The Taylor Series for $\cos x$ is as follows: -

Taylor Series for $x[1] = 0$ is as follows: -

For term = 1, the sum is: 1
For term = 2, the sum is: 1
For term = 3, the sum is: 1
For term = 4, the sum is: 1
For term = 5, the sum is: 1
For term = 6, the sum is: 1
For term = 7, the sum is: 1
For term = 8, the sum is: 1
For term = 9, the sum is: 1
For term = 10, the sum is: 1
For term = 11, the sum is: 1
For term = 12, the sum is: 1
For term = 13, the sum is: 1
For term = 14, the sum is: 1
For term = 15, the sum is: 1
For term = 16, the sum is: 1
For term = 17, the sum is: 1
For term = 18, the sum is: 1
For term = 19, the sum is: 1
For term = 20, the sum is: 1

The number of terms required to arrive at a convergent value for $x[1] = 0$ is 2.

Taylor Series for $x[2] = 5.235988e-01$ is as follows: -

For term = 1, the sum is: 1
For term = 2, the sum is: 8.629222e-01
For term = 3, the sum is: 8.660539e-01
For term = 4, the sum is: 8.660253e-01
For term = 5, the sum is: 8.660254e-01
For term = 6, the sum is: 8.660254e-01
For term = 7, the sum is: 8.660254e-01
For term = 8, the sum is: 8.660254e-01
For term = 9, the sum is: 8.660254e-01
For term = 10, the sum is: 8.660254e-01
For term = 11, the sum is: 8.660254e-01
For term = 12, the sum is: 8.660254e-01
For term = 13, the sum is: 8.660254e-01
For term = 14, the sum is: 8.660254e-01
For term = 15, the sum is: 8.660254e-01
For term = 16, the sum is: 8.660254e-01
For term = 17, the sum is: 8.660254e-01
For term = 18, the sum is: 8.660254e-01
For term = 19, the sum is: 8.660254e-01
For term = 20, the sum is: 8.660254e-01

The number of terms required to arrive at a convergent value for $x[2] = 5.235988e-01$ ✓

is 5.

Taylor Series for $x[3] = 7.853982e-01$ is as follows: -

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For term = 1, the sum is: 1
For term = 2, the sum is: 6.915749e-01
For term = 3, the sum is: 7.074292e-01
For term = 4, the sum is: 7.071032e-01
For term = 5, the sum is: 7.071068e-01
For term = 6, the sum is: 7.071068e-01
For term = 7, the sum is: 7.071068e-01
For term = 8, the sum is: 7.071068e-01
For term = 9, the sum is: 7.071068e-01
For term = 10, the sum is: 7.071068e-01
For term = 11, the sum is: 7.071068e-01
For term = 12, the sum is: 7.071068e-01
For term = 13, the sum is: 7.071068e-01
For term = 14, the sum is: 7.071068e-01
For term = 15, the sum is: 7.071068e-01
For term = 16, the sum is: 7.071068e-01
For term = 17, the sum is: 7.071068e-01
For term = 18, the sum is: 7.071068e-01
For term = 19, the sum is: 7.071068e-01
For term = 20, the sum is: 7.071068e-01
The number of terms required to arrive at a convergent value for  $x[3] = 7.853982e-01$  ✓
is 6.
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Taylor Series for $x[4] = 1.047198e+00$ is as follows: -

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For term = 1, the sum is: 1
For term = 2, the sum is: 4.516886e-01
For term = 3, the sum is: 5.017962e-01
For term = 4, the sum is: 4.999646e-01
For term = 5, the sum is: 5.000004e-01
For term = 6, the sum is: 5.000000e-01
For term = 7, the sum is: 5.000000e-01
For term = 8, the sum is: 5.000000e-01
For term = 9, the sum is: 5.000000e-01
For term = 10, the sum is: 5.000000e-01
For term = 11, the sum is: 5.000000e-01
For term = 12, the sum is: 5.000000e-01
For term = 13, the sum is: 5.000000e-01
For term = 14, the sum is: 5.000000e-01
For term = 15, the sum is: 5.000000e-01
For term = 16, the sum is: 5.000000e-01
For term = 17, the sum is: 5.000000e-01
For term = 18, the sum is: 5.000000e-01
For term = 19, the sum is: 5.000000e-01
For term = 20, the sum is: 5.000000e-01
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The number of terms required to arrive at a convergent value for $x[4] = 1.047198e+00$ ✓
is 6.

Taylor Series for $x[5] = 1.570796e+00$ is as follows: -

For term = 1, the sum is: 1
For term = 2, the sum is: -2.337006e-01
For term = 3, the sum is: 1.996896e-02
For term = 4, the sum is: -8.945230e-04
For term = 5, the sum is: 2.473728e-05
For term = 6, the sum is: -4.647660e-07
For term = 7, the sum is: 6.321470e-09
For term = 8, the sum is: -6.513357e-11
For term = 9, the sum is: 5.260631e-13
For term = 10, the sum is: -3.376921e-15
For term = 11, the sum is: 6.081768e-17
For term = 12, the sum is: 4.245776e-17
For term = 13, the sum is: 4.253983e-17
For term = 14, the sum is: 4.253952e-17
For term = 15, the sum is: 4.253952e-17
For term = 16, the sum is: 4.253952e-17
For term = 17, the sum is: 4.253952e-17
For term = 18, the sum is: 4.253952e-17
For term = 19, the sum is: 4.253952e-17
For term = 20, the sum is: 4.253952e-17

The number of terms required to arrive at a convergent value for $x[5] = 1.570796e+00$ ✓
is 7.

Taylor Series for $x[6] = 2.094395e+00$ is as follows: -

For term = 1, the sum is: 1
For term = 2, the sum is: -1.193245e+00
For term = 3, the sum is: -3.915245e-01
For term = 4, the sum is: -5.087492e-01
For term = 5, the sum is: -4.995670e-01
For term = 6, the sum is: -5.000145e-01
For term = 7, the sum is: -4.999996e-01
For term = 8, the sum is: -5.000000e-01
For term = 9, the sum is: -5.000000e-01
For term = 10, the sum is: -5.000000e-01
For term = 11, the sum is: -5.000000e-01
For term = 12, the sum is: -5.000000e-01
For term = 13, the sum is: -5.000000e-01
For term = 14, the sum is: -5.000000e-01
For term = 15, the sum is: -5.000000e-01
For term = 16, the sum is: -5.000000e-01
For term = 17, the sum is: -5.000000e-01
For term = 18, the sum is: -5.000000e-01
For term = 19, the sum is: -5.000000e-01

For term = 20, the sum is: -5.000000e-01

The number of terms required to arrive at a convergent value for $x[6] = 2.094395e+00$ is 8. ✓

Taylor Series for $x[7] = 3.141593e+00$ is as follows: -

For term = 1, the sum is: 1

For term = 2, the sum is: -3.934802e+00

For term = 3, the sum is: 1.239099e-01

For term = 4, the sum is: -1.211353e+00

For term = 5, the sum is: -9.760222e-01

For term = 6, the sum is: -1.001829e+00

For term = 7, the sum is: -9.998995e-01

For term = 8, the sum is: -1.000004e+00

For term = 9, the sum is: -9.999999e-01

For term = 10, the sum is: -1.000000e+00

For term = 11, the sum is: -1.000000e+00

For term = 12, the sum is: -1.000000e+00

For term = 13, the sum is: -1.000000e+00

For term = 14, the sum is: -1.000000e+00

For term = 15, the sum is: -1.000000e+00

For term = 16, the sum is: -1.000000e+00

For term = 17, the sum is: -1.000000e+00

For term = 18, the sum is: -1.000000e+00

For term = 19, the sum is: -1.000000e+00

For term = 20, the sum is: -1.000000e+00

The number of terms required to arrive at a convergent value for $x[7] = 3.141593e+00$ is 9. ✓

Taylor Series for $x[8] = 6.283185e+00$ is as follows: -

For term = 1, the sum is: 1

For term = 2, the sum is: -1.873921e+01

For term = 3, the sum is: 4.620019e+01

For term = 4, the sum is: -3.925663e+01

For term = 5, the sum is: 2.098801e+01

For term = 6, the sum is: -5.438247e+00

For term = 7, the sum is: 2.465289e+00

For term = 8, the sum is: 7.508983e-01

For term = 9, the sum is: 1.032904e+00

For term = 10, the sum is: 9.965214e-01

For term = 11, the sum is: 1.000301e+00

For term = 12, the sum is: 9.999782e-01

For term = 13, the sum is: 1.000001e+00

For term = 14, the sum is: 9.999999e-01

For term = 15, the sum is: 1.000000e+00

For term = 16, the sum is: 1.000000e+00

For term = 17, the sum is: 1.000000e+00

For term = 18, the sum is: 1.000000e+00

For term = 19, the sum is: 1.000000e+00
For term = 20, the sum is: 1.000000e+00
The number of terms required to arrive at a convergent value for $x[8] = 6.283185e+00$ ✓
is 14.

Taylor Series for $x[9] = 1.347743e+00$ is as follows: -

For term = 1, the sum is: 1
For term = 2, the sum is: 9.179407e-02
For term = 3, the sum is: 2.292671e-01
For term = 4, the sum is: 2.209435e-01
For term = 5, the sum is: 2.212135e-01
For term = 6, the sum is: 2.212080e-01
For term = 7, the sum is: 2.212081e-01
For term = 8, the sum is: 2.212081e-01
For term = 9, the sum is: 2.212081e-01
For term = 10, the sum is: 2.212081e-01
For term = 11, the sum is: 2.212081e-01
For term = 12, the sum is: 2.212081e-01
For term = 13, the sum is: 2.212081e-01
For term = 14, the sum is: 2.212081e-01
For term = 15, the sum is: 2.212081e-01
For term = 16, the sum is: 2.212081e-01
For term = 17, the sum is: 2.212081e-01
For term = 18, the sum is: 2.212081e-01
For term = 19, the sum is: 2.212081e-01
For term = 20, the sum is: 2.212081e-01
The number of terms required to arrive at a convergent value for $x[9] = 1.347743e+00$ ✓
is 6.

Taylor Series for $x[10] = 2.145708e+00$ is as follows: -

For term = 1, the sum is: 1
For term = 2, the sum is: -1.302031e+00
For term = 3, the sum is: -4.188065e-01
For term = 4, the sum is: -5.543539e-01
For term = 5, the sum is: -5.432098e-01
For term = 6, the sum is: -5.437799e-01
For term = 7, the sum is: -5.437600e-01
For term = 8, the sum is: -5.437605e-01
For term = 9, the sum is: -5.437605e-01
For term = 10, the sum is: -5.437605e-01
For term = 11, the sum is: -5.437605e-01
For term = 12, the sum is: -5.437605e-01
For term = 13, the sum is: -5.437605e-01
For term = 14, the sum is: -5.437605e-01
For term = 15, the sum is: -5.437605e-01
For term = 16, the sum is: -5.437605e-01
For term = 17, the sum is: -5.437605e-01

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For term = 18, the sum is: -5.437605e-01
For term = 19, the sum is: -5.437605e-01
For term = 20, the sum is: -5.437605e-01
The number of terms required to arrive at a convergent value for x[10] = 2.145708e+00 ✓
is 8.
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