

Power Series Expansion for Arcsin

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This is a python programme to calculate arcsin to 12 significant digits with a function using a while loop.

```
In [3]: # Power series expansion for arcsin

def psarc(x):
    import numpy as np

    accuracy = 1e-12

    # Initialise the zeroth term and the sum
    n = 0
    termn = 1
    powersum = termn

    # use a while Loop to get the required accuracy
    while (abs(termn / powersum) > accuracy):
        n = n + 1
        termn = termn * x / n
        powersum = powersum + termn

    print("Number of terms in power series = ", n)
    print("Power series expansion for arcsin(x) = ", powersum)
    print("NumPy result for arcsin(x) = ", (x))

psarc(0.25)
psarc(0.95)
```

```
Number of terms in power series = 21
Power series expansion for arcsin(x) = 12.182493960702905
NumPy result for arcsin(x) = 2.5
Number of terms in power series = 40
Power series expansion for arcsin(x) = 22026.4657948028
NumPy result for arcsin(x) = 10
```