Solution Review: Integrating Complex Functions

This lesson provides a detailed solution review to integrating complex functions.

WE'LL COVER THE FOLLOWING

Solution

```
from sympy import *

def f(x):     # just a mathematical function
  return atan(x)

def g(x):       # just a mathematical function
  return exp(x)

x = Symbol('x')

def ts_integral(f, x, n=4, lim1=None, lim2=None):
  ts = f(x).series(x, 0, n).removeO()
  integral = integrate(ts, (x, lim1, lim2))
  return ts, integral.evalf(3)

output_1 = ts_integral(f, x, 10, 0, pi/4)
output_2 = ts_integral(g, x)

print("Taylor Series of f(x):", output_1[0])
print("Integral of f(x):", output_1[1])
print("-----")
print("Taylor Series of g(x):", output_2[0])
print("Integral of g(x):", output_2[1])
```

Explanation

- In the `ts_signal` function parameter, the default value of `n` is set to 4 and the default values of `lim1` and `lim2` are set to `None` .

- In line 12, we compute the Taylor series up to the order `n` and remove the trailing term.
- In line 13, we compute the integral of the Taylor series `ts`. Integration limits of this integral are `lim1` and `lim2`.
- In line 14, the `ts` is returned alongside the integral of `ts` with numerical values up to 3 significant figures.
- If the user does not specify the parameters `lim1`, `lim2`, and/or `n` when calling the function, the default values of these parameters will be used. An example of this is shown in lines 16 - 17 where `ts_integral` is first called with 5 arguments and then it is called with 2 arguments.

In the next lesson, you will solve a differential equation in Python.