Solution Review: Solve a Differential Equation

This lesson discusses the solution to the previous exercise.

Solution

Solution of the following differential equation is given:

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y(x) = sin(x)$$

```python
from sympy import *

x = Symbol('x')
y = Function('y')(x)

dydx = y.diff(x)
d2ydx2 = y.diff(x, x)       # alternatively d2ydx2 = dydx.diff(x)

diff_eq = Eq(d2ydx2 + (2 * dydx) + y - sin(x))
z = dsolve(diff_eq)

print(z.rhs)
```

Explanation

- In line 6, we have defined $\frac{dy}{dx}$ using the `diff` function.

- In line 7, we have defined $\frac{d^2y}{dx^2}$ using the `diff` function.

- In line 9, we have set up the equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y(x) - sin(x) = 0$

using the `Eq` function.

- In line 10, we have solved the equation `diff_eq` using the `dsolve` method.

We are done and dusted with symbolic computation in Python for now. Let's move on to scientific algorithms now.