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Link GitHub : https://github.com/hako-975/uas_kecerdasan_buatan

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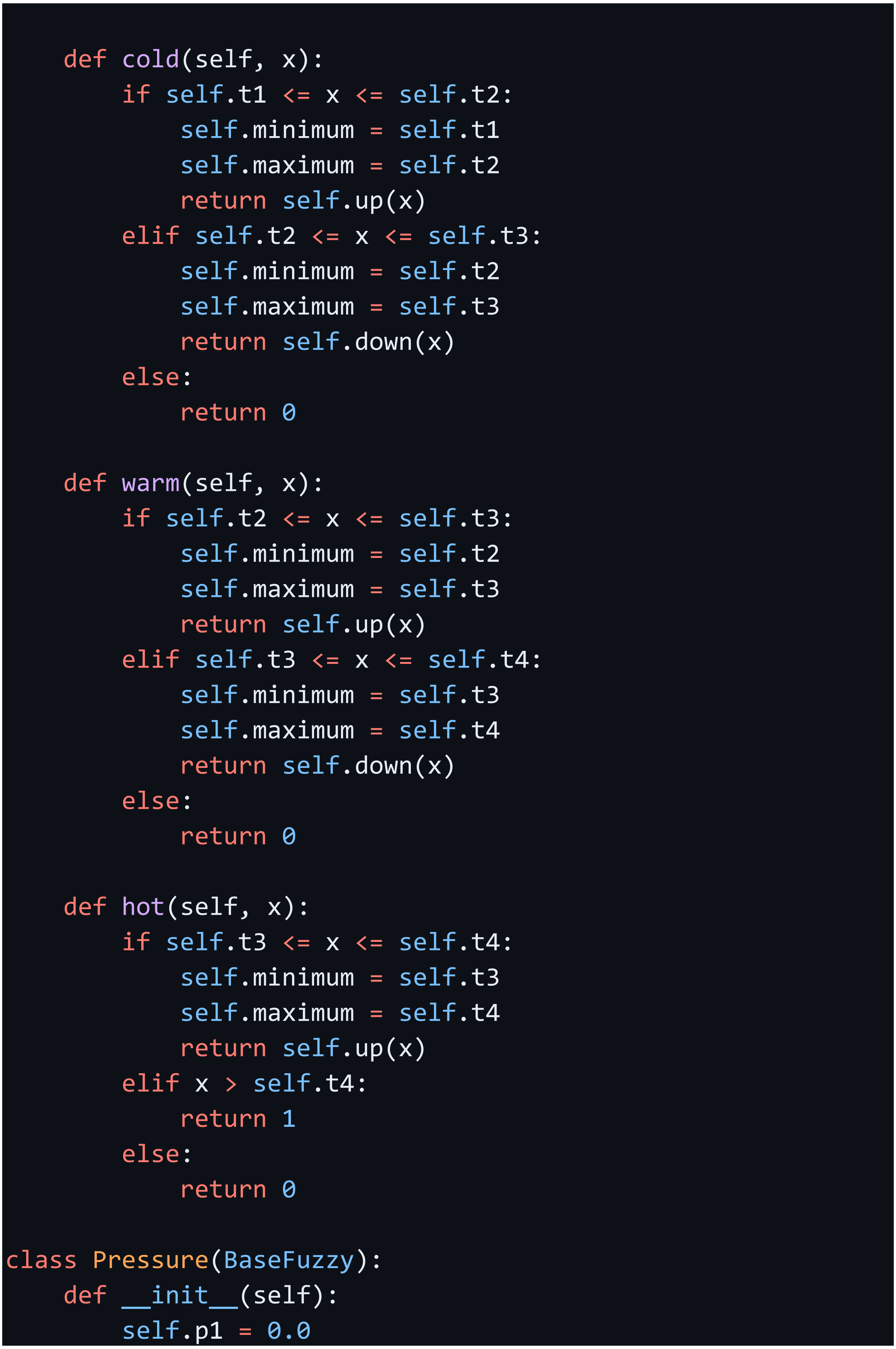
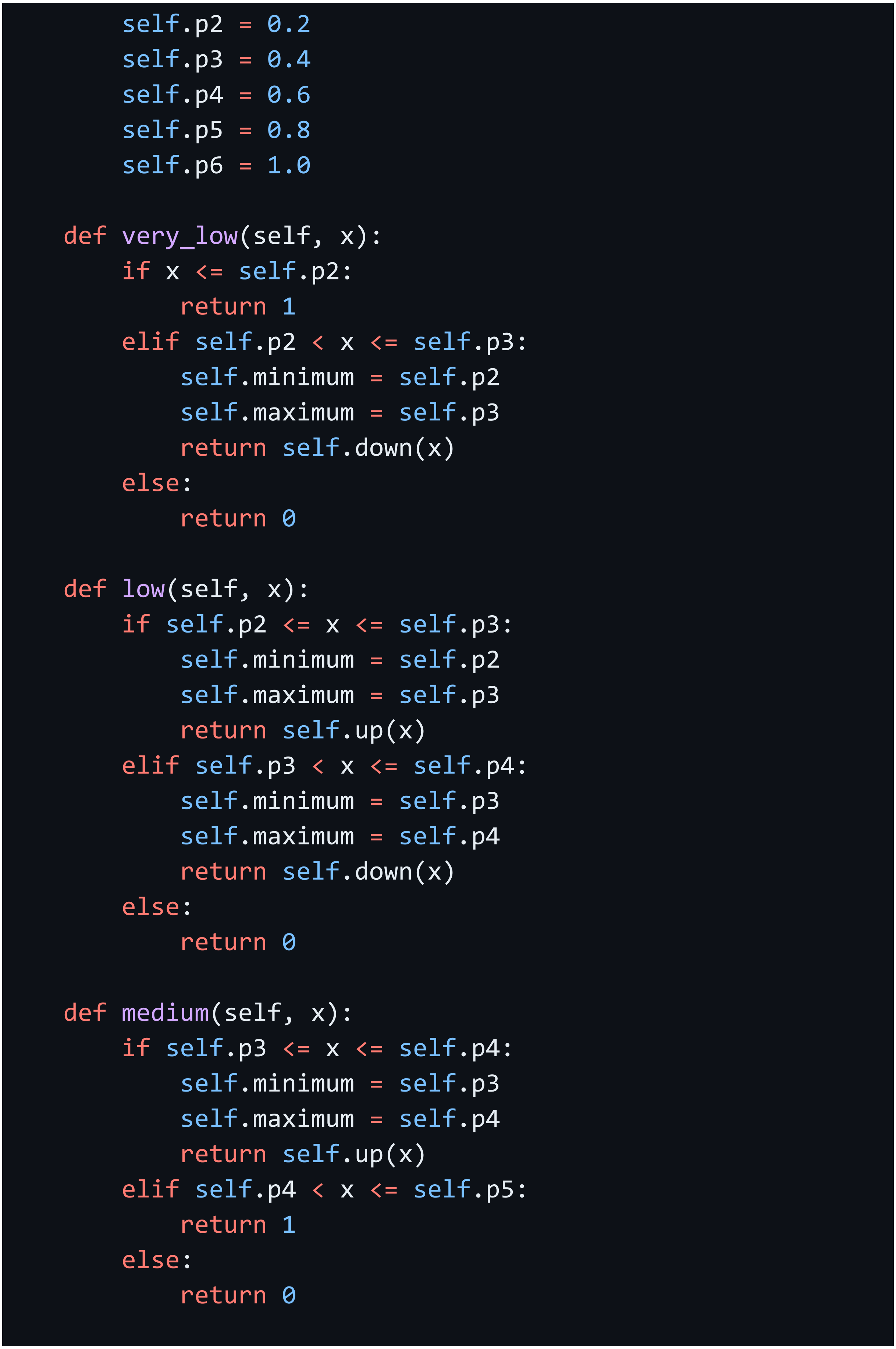
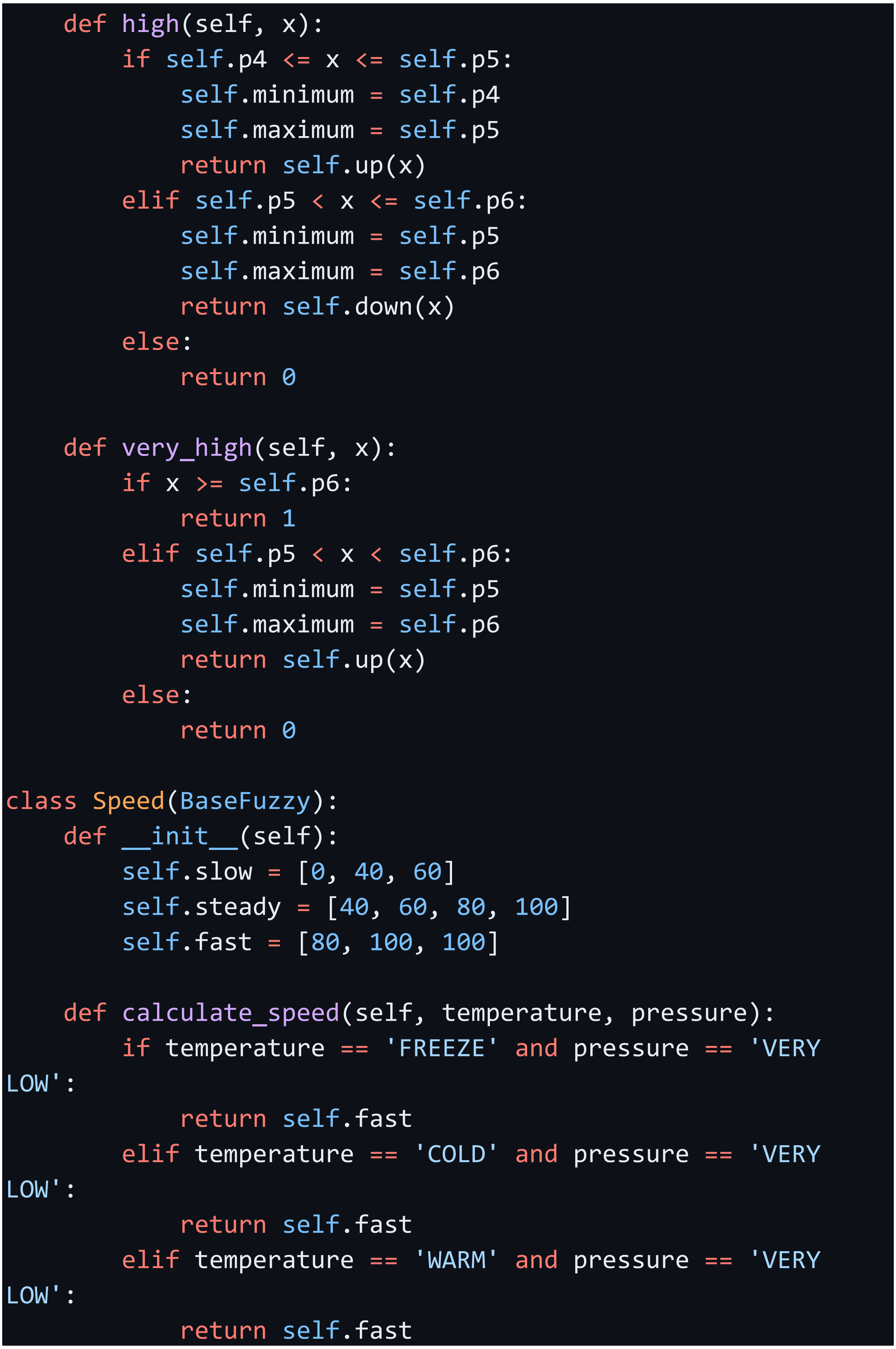
```
import numpy as np
from matplotlib import pyplot as plt

class BaseFuzzy():
    def __init__(self):
        self.minimum = 0
        self.maximum = 0

    def up(self, x):
        return (x - self.minimum) / (self.maximum - 
self.minimum)

    def down(self, x):
        return (self.maximum - x) / (self.maximum - 
self.minimum)

class Temp(BaseFuzzy):
    def __init__(self):
        self.t1 = 0
        self.t2 = 40
        self.t3 = 60
        self.t4 = 80
        self.tn = 100

    def freeze(self, x):
        if x < self.t1:
            return 1
        elif self.t1 <= x <= self.t2:
            self.minimum = self.t1
            self.maximum = self.t2
            return self.down(x)
        else:
            return 0
```



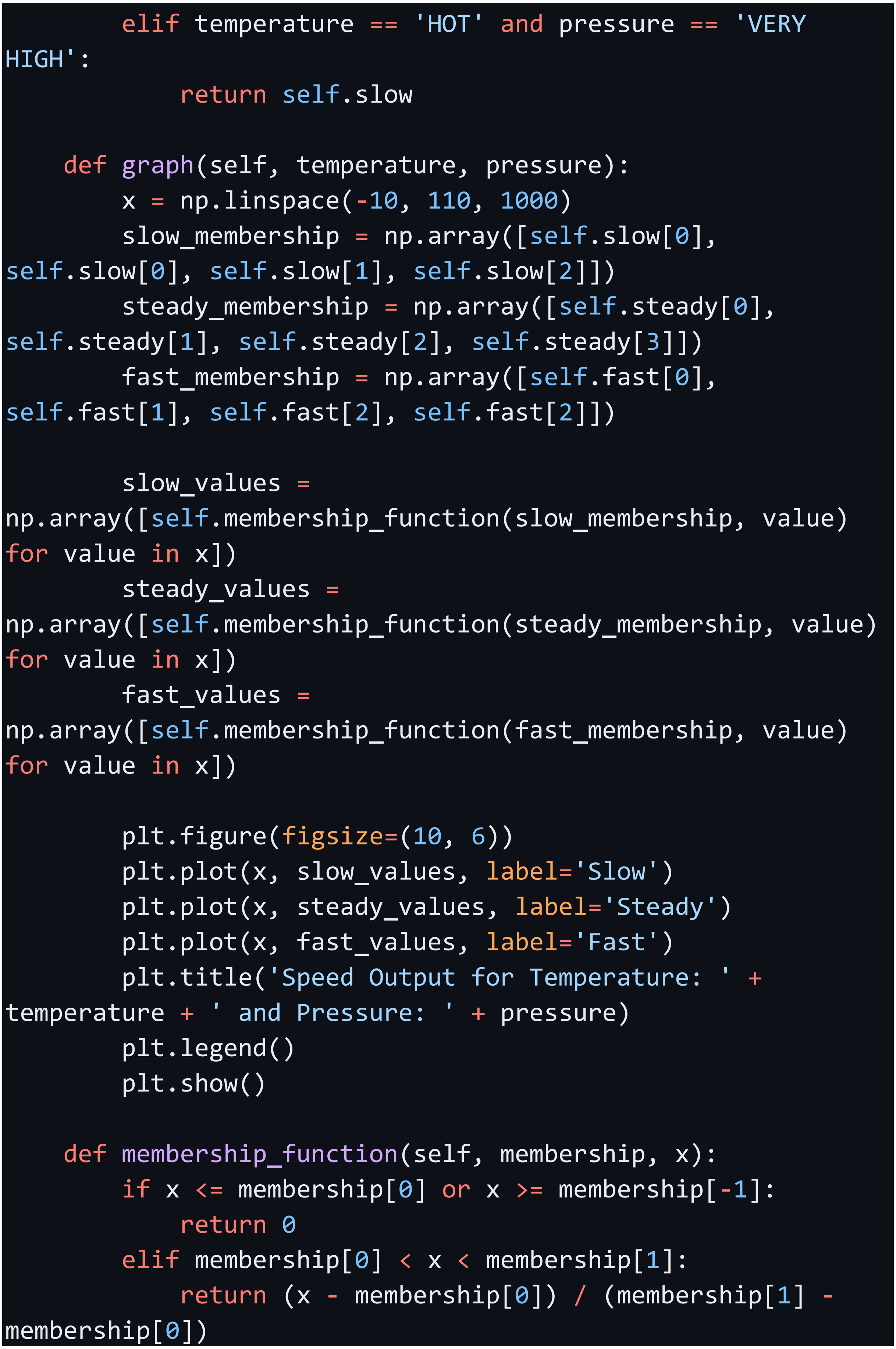
```python
    def cold(self, x):
        if self.t1 <= x <= self.t2:
            self.minimum = self.t1
            self.maximum = self.t2
            return self.up(x)
        elif self.t2 <= x <= self.t3:
            self.minimum = self.t2
            self.maximum = self.t3
            return self.down(x)
        else:
            return 0

    def warm(self, x):
        if self.t2 <= x <= self.t3:
            self.minimum = self.t2
            self.maximum = self.t3
            return self.up(x)
        elif self.t3 <= x <= self.t4:
            self.minimum = self.t3
            self.maximum = self.t4
            return self.down(x)
        else:
            return 0

    def hot(self, x):
        if self.t3 <= x <= self.t4:
            self.minimum = self.t3
            self.maximum = self.t4
            return self.up(x)
        elif x > self.t4:
            return 1
        else:
            return 0

class Pressure(BaseFuzzy):
    def __init__(self):
        self.p1 = 0.0
```



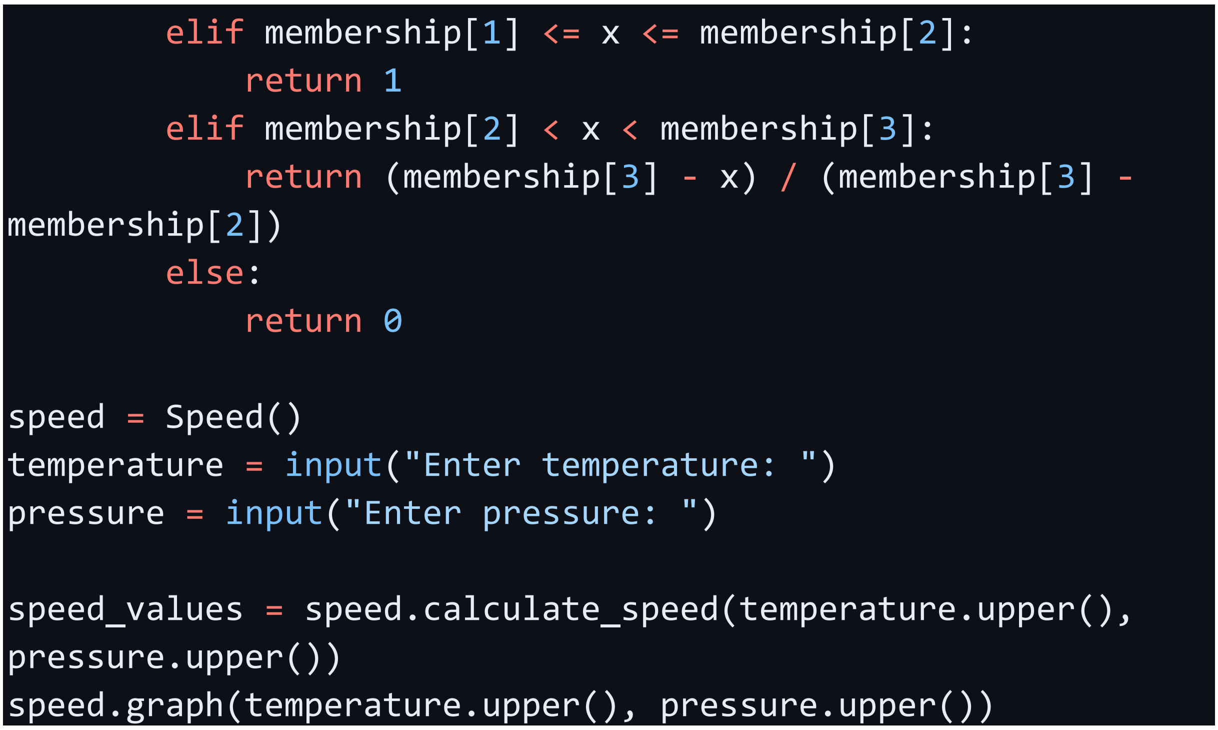
```
        self.p2 = 0.2
        self.p3 = 0.4
        self.p4 = 0.6
        self.p5 = 0.8
        self.p6 = 1.0

    def very_low(self, x):
        if x <= self.p2:
            return 1
        elif self.p2 < x <= self.p3:
            self.minimum = self.p2
            self.maximum = self.p3
            return self.down(x)
        else:
            return 0

    def low(self, x):
        if self.p2 <= x <= self.p3:
            self.minimum = self.p2
            self.maximum = self.p3
            return self.up(x)
        elif self.p3 < x <= self.p4:
            self.minimum = self.p3
            self.maximum = self.p4
            return self.down(x)
        else:
            return 0

    def medium(self, x):
        if self.p3 <= x <= self.p4:
            self.minimum = self.p3
            self.maximum = self.p4
            return self.up(x)
        elif self.p4 < x <= self.p5:
            return 1
        else:
            return 0
```



```
    def high(self, x):
        if self.p4 <= x <= self.p5:
            self.minimum = self.p4
            self.maximum = self.p5
            return self.up(x)
        elif self.p5 < x <= self.p6:
            self.minimum = self.p5
            self.maximum = self.p6
            return self.down(x)
        else:
            return 0

    def very_high(self, x):
        if x >= self.p6:
            return 1
        elif self.p5 < x < self.p6:
            self.minimum = self.p5
            self.maximum = self.p6
            return self.up(x)
        else:
            return 0

class Speed(BaseFuzzy):
    def __init__(self):
        self.slow = [0, 40, 60]
        self.steady = [40, 60, 80, 100]
        self.fast = [80, 100, 100]

    def calculate_speed(self, temperature, pressure):
        if temperature == 'FREEZE' and pressure == 'VERY
LOW':
            return self.fast
        elif temperature == 'COLD' and pressure == 'VERY
LOW':
            return self.fast
        elif temperature == 'WARM' and pressure == 'VERY
LOW':
            return self.fast
        elif temperature == 'HOT' and pressure == 'VERY
LOW':
            return self.fast
        elif temperature == 'FREEZE' and pressure == 'LOW':
            return self.fast
        elif temperature == 'COLD' and pressure == 'LOW':
            return self.steady
        elif temperature == 'WARM' and pressure == 'LOW':
            return self.steady
        elif temperature == 'HOT' and pressure == 'LOW':
            return self.steady
        elif temperature == 'FREEZE' and pressure ==
'MEDIUM':
            return self.steady
        elif temperature == 'COLD' and pressure == 'MEDIUM':
            return self.steady
        elif temperature == 'WARM' and pressure == 'MEDIUM':
            return self.steady
        elif temperature == 'HOT' and pressure == 'MEDIUM':
            return self.steady
        elif temperature == 'FREEZE' and pressure == 'HIGH':
            return self.steady
        elif temperature == 'COLD' and pressure == 'HIGH':
            return self.steady
        elif temperature == 'WARM' and pressure == 'HIGH':
            return self.steady
        elif temperature == 'HOT' and pressure == 'HIGH':
            return self.slow
        elif temperature == 'FREEZE' and pressure == 'VERY
HIGH':
            return self.slow
        elif temperature == 'COLD' and pressure == 'VERY
HIGH':
            return self.slow
        elif temperature == 'WARM' and pressure == 'VERY
HIGH':
            return self.slow
```



```
        elif temperature == 'HOT' and pressure == 'VERY
HIGH':
            return self.slow

    def graph(self, temperature, pressure):
        x = np.linspace(-10, 110, 1000)
        slow_membership = np.array([self.slow[0],
self.slow[0], self.slow[1], self.slow[2]])
        steady_membership = np.array([self.steady[0],
self.steady[1], self.steady[2], self.steady[3]])
        fast_membership = np.array([self.fast[0],
self.fast[1], self.fast[2], self.fast[2]])

        slow_values =
np.array([self.membership_function(slow_membership, value)
for value in x])
        steady_values =
np.array([self.membership_function(steady_membership, value)
for value in x])
        fast_values =
np.array([self.membership_function(fast_membership, value)
for value in x])

        plt.figure(figsize=(10, 6))
        plt.plot(x, slow_values, label='Slow')
        plt.plot(x, steady_values, label='Steady')
        plt.plot(x, fast_values, label='Fast')
        plt.title('Speed Output for Temperature: ' +
temperature + ' and Pressure: ' + pressure)
        plt.legend()
        plt.show()

    def membership_function(self, membership, x):
        if x <= membership[0] or x >= membership[-1]:
            return 0
        elif membership[0] < x < membership[1]:
            return (x - membership[0]) / (membership[1] -
membership[0])
```



```
        elif membership[1] <= x <= membership[2]:
            return 1
        elif membership[2] < x < membership[3]:
            return (membership[3] - x) / (membership[3] -
membership[2])
        else:
            return 0

speed = Speed()
temperature = input("Enter temperature: ")
pressure = input("Enter pressure: ")

speed_values = speed.calculate_speed(temperature.upper(),
pressure.upper())
speed.graph(temperature.upper(), pressure.upper())
```