Library Imports

In [ ]:
```
import numpy as np
import matplotlib.pyplot as plt
```

$$y'(0) = \frac{y}{y\cos\left(\frac{t}{3}\right)+\alpha \cdot f(t)} + t \, ; y(0) = -1$$

$$\alpha = TUID_{\text{avg}}$$

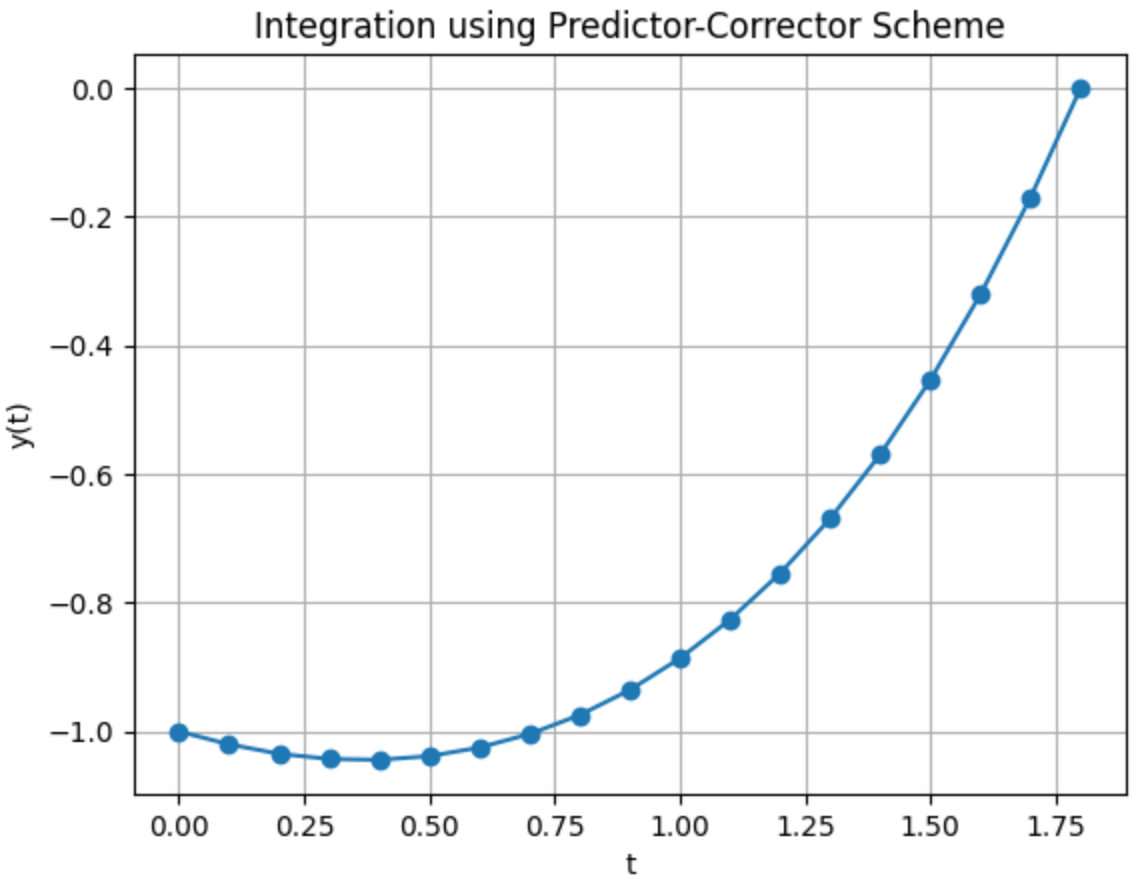
0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
1.00	0.84	0.78	0.73	0.68	0.65	0.61	0.58	0.55	0.53	0.50	0.48	0.45	0.43	0.41	0.39

In [ ]:
```
TUID = [9,1,5,1,8,7,2,8,9]
total_sum = 0

for i in range(len(TUID)):
    total_sum += TUID[i]

alpha = total_sum / len(TUID)

print(f'my TUID average:{alpha}')
```

```
my TUID average:5.555555555555555
```

In [ ]:
```
# Given data
t_values = np.arange(0.0, 1.9, 0.1)
f_values = np.array([1.00, 0.84, 0.78, 0.73, 0.68, 0.65, 0.61, 0.58, 0.55, 0.53, 0.

def dydt(t, y, f_t):
    return y / (y * np.cos(t / 3) + alpha * f_t) + t

h = 0.1
y = [-1]  # Initial value

# Predictor-Corrector Scheme
for j, t in enumerate(t_values[:-1]):
    # Predictor
    y_star = y[-1] + h * dydt(t, y[-1], f_values[j])
    # Corrector
    y_next = y[-1] + (h/2) * (dydt(t, y[-1], f_values[j]) + dydt(t+h, y_star, f_val
    y.append(y_next)

# Plotting
plt.plot(t_values, y, '-o')
plt.xlabel('t')
plt.ylabel('y(t)')
plt.title('Integration using Predictor-Corrector Scheme')
```

```
plt.grid(True)
plt.show()
```



In [ ]:
```
# Estimate the minimum value of y
min_value = min(y)
index = y.index(min_value)
t_min = t_values[index]

print(f"The minimum value of y is approximately {min_value:.4f} at t = {t_min:.1f}"
```

```
The minimum value of y is approximately -1.0441 at t = 0.4
```