

# demo\_integration

November 17, 2025

## 1 A Simple Script to Integrate Differential Equations

### 1.1 Function import

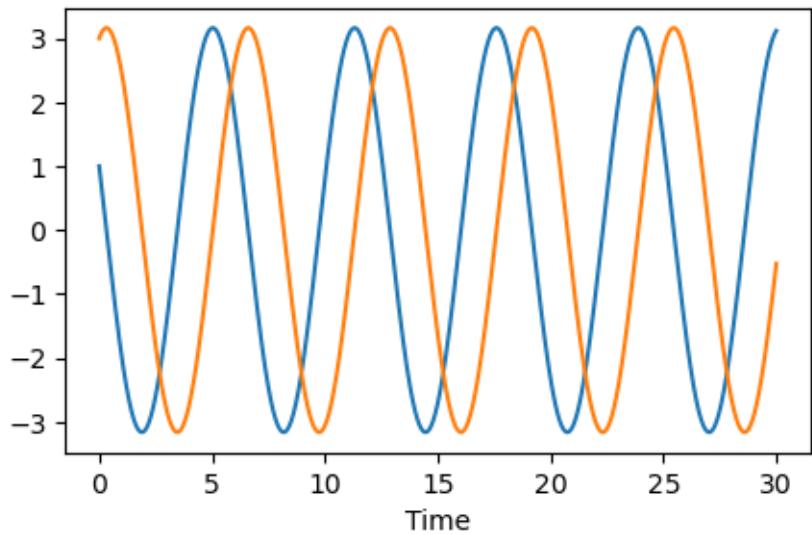
```
[3]: from scipy.integrate import solve_ivp  
from matplotlib.pyplot import subplots
```

### 1.2 Rate Equation Definition

```
[4]: def model(t, variables):  
    """Harmonic Oscillator"""  
  
    X, Y = variables  
  
    dXdt = - Y  
    dYdt = + X  
  
    return [dXdt, dYdt]
```

### 1.3 Integrate and Plot Result

```
[5]: initial_conditions = [1, 2]  
  
time_span = (0, 30)  
  
solution = solve_ivp(model, (0, 30), (1, 3), max_step=0.01)  
  
fig, ax = subplots(figsize=(5, 3))  
  
ax.plot(solution.t, solution.y.T);  
ax.set_xlabel('Time');
```



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