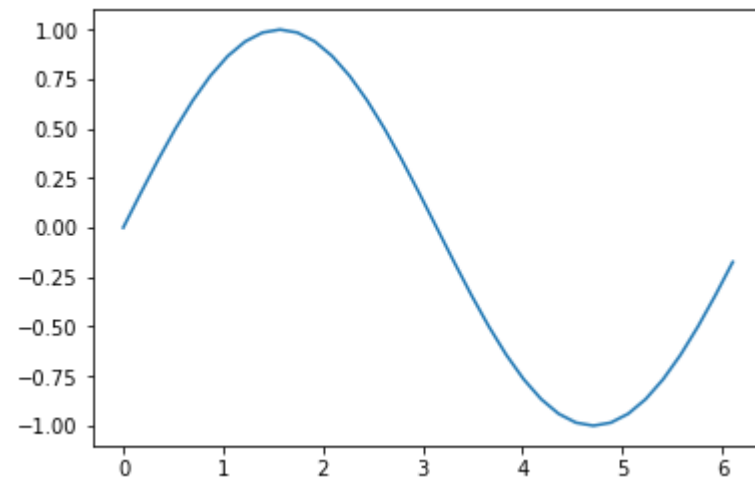


15

```
In [6]: import matplotlib.pyplot as plt
import numpy as np

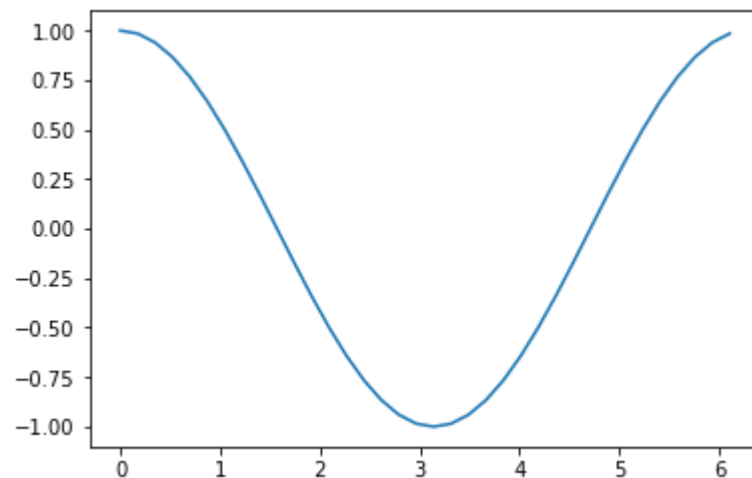
time = np.arange(0, 2 * np.pi, (2 * np.pi)/36)
amplitude = np.sin(radians)
plt.plot(time, amplitude)
plt.show
```

Out[6]: <function matplotlib.pyplot.show(*args, **kw)>



```
In [7]: time2 = np.arange(0, 2 * np.pi, (2 * np.pi)/36)
amplitude2 = np.cos(radians)
plt.plot(time2, amplitude2)
plt.show
```

Out[7]: <function matplotlib.pyplot.show(*args, **kw)>



16

```
In [22]: class Gradebook:
    def __init__(self):
        self.gradebook = {}
        self.up_to_date = False
        self.gpa = {}

    def add_score(self, student_name, score):
        self.up_to_date = False
        if student_name not in self.gradebook.keys():
            self.gradebook[student_name] = [score]
        else:
            self.gradebook[student_name] += [score]

    def print_gradebook(self):
        for student, grades in self.gradebook.items():
            line = student + ', ' + ', '.join(str(grade) for grade in grades)
            print(line)

    def compute_gpa(self, student_name=None):
        if not self.up_to_date:
            for student, grades in self.gradebook.items():
                self.gpa[student] = np.mean(grades)
            self.up_to_date = True
        if not student_name:
            for student, gpa in self.gpa.items():
                line = "GPA for " + student + " is " + str(gpa)
                print(line)
        else:
            if student_name not in self.gpa.keys():
                line = "No student with name " + student_name
            else:
                line = "GPA for " + student_name + " is " + str(self.gpa[student_name])
            print(line)
```

```
In [23]: g = Gradebook()
g.add_score('Ann', 4)
g.add_score('Peter', 2)
g.add_score('Ann', 2)
g.add_score('Ann', 3)
g.add_score('Isabelle', 5)
g.print_gradebook()
g.compute_gpa()
g.compute_gpa('Bill')
g.compute_gpa('Ann')
```

```
Ann, 4, 2, 3
Peter, 2
Isabelle, 5
GPA for Ann is 3.0
GPA for Peter is 2.0
GPA for Isabelle is 5.0
No student with name Bill
GPA for Ann is 3.0
```

In []:

