

Python 3.9.6 (v3.9.6:db3ff76da1, Jun 28 2021, 11:49:53)

[Clang 6.0 (clang-600.0.57)] on darwin

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```
>>> num1 = 5
>>> num2 = 2
>>> num3 = -3
>>> num4 = 0
>>> x_vtx = 2.71
>>> y_vtx = -8.33
>>> z_vtx = 5.20
>>> point1 = (x_vtx, y_vtx, z_vtx)
>>> grp1 = "char_grp"
>>> grp2 = "bldg_grp"
>>> grp3 = "env_grp"
>>> all_nums = [num1, num2, num3, num4]
>>> point2 = (x_vtx * 2.5, y_vtx, z_vtx * -1)
>>> point3 = (0.0, 0.0, z_vtx)
>>> point4 = (0.0, y_vtx * 5, z_vtx)
>>> all_points = [point1, point2, point3, point4]
>>> type(num1)
<class 'int'>
>>> type(x_vtx)
<class 'float'>
>>> type(grp1)
<class 'str'>
>>> type(all_nums)
<class 'list'>
>>> type(point1)
<class 'tuple'>
>>> scene = {}
>>> type(scene)
<class 'dict'>
>>> scene[grp1] = [("rat", point1), ("dog", point1), ("cat", point3),
("bear", point2)]
>>> from pprint import pprint
>>> pprint(scene)
{'char_grp': [('rat', (2.71, -8.33, 5.2)),
('dog', (2.71, -8.33, 5.2)),
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        ('cat', (0.0, 0.0, 5.2)),
        ('bear', (6.775, -8.33, -5.2)))]}
>>> point1[1]
-8.33
>>> point4
(0.0, -41.65, 5.2)
>>> point4[-1]
5.2
>>> # tuples and strings are immutable
>>> point4[0] = 4
Traceback (most recent call last):
  File "<pyshell#30>", line 1, in <module>
    point4[0] = 4
TypeError: 'tuple' object does not support item assignment
>>> all_points
[(2.71, -8.33, 5.2), (6.775, -8.33, -5.2), (0.0, 0.0, 5.2), (0.0, -41.65, 5.2)]
>>> all_points.append(num1)
>>> all_points
[(2.71, -8.33, 5.2), (6.775, -8.33, -5.2), (0.0, 0.0, 5.2), (0.0, -41.65, 5.2), 5]
>>> all_points.append(scene["char_grp"])
>>> pprint(all_points)
[(2.71, -8.33, 5.2),
 (6.775, -8.33, -5.2),
 (0.0, 0.0, 5.2),
 (0.0, -41.65, 5.2),
 5,
 [('rat', (2.71, -8.33, 5.2)),
 ('dog', (2.71, -8.33, 5.2)),
 ('cat', (0.0, 0.0, 5.2)),
 ('bear', (6.775, -8.33, -5.2)))]
>>> print(all_points)
[(2.71, -8.33, 5.2), (6.775, -8.33, -5.2), (0.0, 0.0, 5.2), (0.0, -41.65, 5.2), 5,
 [('rat', (2.71, -8.33, 5.2)), ('dog', (2.71, -8.33, 5.2)), ('cat', (0.0, 0.0, 5.2)),
 ('bear', (6.775, -8.33, -5.2)))]
>>> del all_points[-2:-1]
>>> pprint(all_points)
[(2.71, -8.33, 5.2),
 (6.775, -8.33, -5.2),

```

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(0.0, 0.0, 5.2),
(0.0, -41.65, 5.2),
[('rat', (2.71, -8.33, 5.2)),
 ('dog', (2.71, -8.33, 5.2)),
 ('cat', (0.0, 0.0, 5.2)),
 ('bear', (6.775, -8.33, -5.2)))]
>>> len(all_points)
5
>>> del all_points[4]
>>> all_points
[(2.71, -8.33, 5.2), (6.775, -8.33, -5.2), (0.0, 0.0, 5.2), (0.0, -41.65, 5.2)]
>>> print(f"number of items in all_points list is {len(all_points)}")
number of items in all_points list is 4
>>> num_list = []
>>> type(num_list)
<class 'list'>
>>> num_list = [num1, num2]
>>> num_list
[5, 2]
>>> num_list.append(num3)
>>> num_list
[5, 2, -3]
>>> vtx_list = scene["char_grp"]
>>> vtx_list
[('rat', (2.71, -8.33, 5.2)), ('dog', (2.71, -8.33, 5.2)), ('cat', (0.0, 0.0, 5.2)),
 ('bear', (6.775, -8.33, -5.2))]
>>> vtx_list = [point1, point2, point3]
>>> vtx_list
[(2.71, -8.33, 5.2), (6.775, -8.33, -5.2), (0.0, 0.0, 5.2)]
>>> num_list
[5, 2, -3]
>>> num_list.extend(vtx_list)
>>> num_list
[5, 2, -3, (2.71, -8.33, 5.2), (6.775, -8.33, -5.2), (0.0, 0.0, 5.2)]
>>> num_list.sort()
Traceback (most recent call last):
  File "<pyshell#56>", line 1, in <module>
    num_list.sort()

```

TypeError: '<' not supported between instances of 'tuple' and 'int'

```
>>> num_list
```

```
[5, 2, -3, (2.71, -8.33, 5.2), (6.775, -8.33, -5.2), (0.0, 0.0, 5.2)]
```

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>>>
```