1. Fork 第 05 周打卡仓库至个人名下，然后将名下的这个仓库 Clone 到你的本地计算机

Python编程与数据处理系统学习笔记（2000字）

一、AI辅助编程的双刃剑特性

自动化代码生成的优势

代码补全效率提升50%以上（如GitHub Copilot）

快速生成基础框架代码（Flask/Django项目初始化时间减少70%）

复杂算法实现辅助（如机器学习模型代码生成）

典型错误类型与调试策略

辑错误：AI生成的排序算法错误率约15%（需手动验证）

API过时：30%的自动生成代码使用已弃用库版本

二、数据处理工具链深度对比

Pandas核心特性

内存映射技术处理20GB以上CSV文件

矢量化运算比原生Python快100倍

惰性执行引擎减少60%内存占用

多线程查询优化（8核CPU利用率达90%）

三、函数工程化实践要点

参数传递规范

类型注解使代码错误减少40%

python

```
def process_data(
    df: pd.DataFrame,
    threshold: float = 0.5
) -> tuple[pd.DataFrame, dict]:
    """文档字符串规范示例"""
    mask = df['score'] > threshold
    return df[mask], {'valid_count': sum(mask)}
```

异常处理模板

python

```
try:
    df = pd.read_excel(input_path)
except FileNotFoundError as e:
    logger.error(f"文件路径错误: {e}")
    raise SystemExit(1)
except ValueError as e:
    logger.warning(f"数据格式问题: {e}")
    df = fallback_loading()
```

四、命令行工具开发进阶

Click vs Argparse对比

python
```
# Click现代实现
@click.command()
@click.option('--input', type=click.Path(exists=True))
def cli(input):
    click.echo(f"处理 {input}")

# Argparse传统方案
parser = argparse.ArgumentParser()
parser.add_argument('--input', required=True)
args = parser.parse_args()
```
性能优化技巧

使用PyOxidizer打包使启动速度提升5倍

异步IO处理使网络请求吞吐量提高3倍

五、调试方法论体系
分层调试策略

Level1: print/logging（快速验证）

Level2: pdb/ipdb（交互式调试）

Level3: PyCharm专业调试器（复杂断点）

典型调试场景

python
```
# 1. 查看数据流水线
df.pipe(debug_shape)  # 自定义调试函数

# 2. 内存分析
import tracemalloc
tracemalloc.start()
# ...执行代码...
snapshot = tracemalloc.take_snapshot()
```

top_stats = snapshot.statistics('lineno')

六、数据思维培养路径

结构化思维训练

二维表操作：掌握pivot/melt/stack等变形操作

时间序列处理：resample/rolling窗口计算

关系型操作：merge/join性能优化

性能优化案例

python

```
# 低效实现
df.apply(lambda x: x*2 if x>0 else x/2, axis=1)

# 高效实现
import numpy as np
df = np.where(df > 0, df*2, df/2)
```

七、依赖管理最佳实践

现代工具链

bash

```
# 创建隔离环境
python -m venv .venv
source .venv/bin/activate

# 依赖声明
pip install pip-tools
pip-compile requirements.in
```

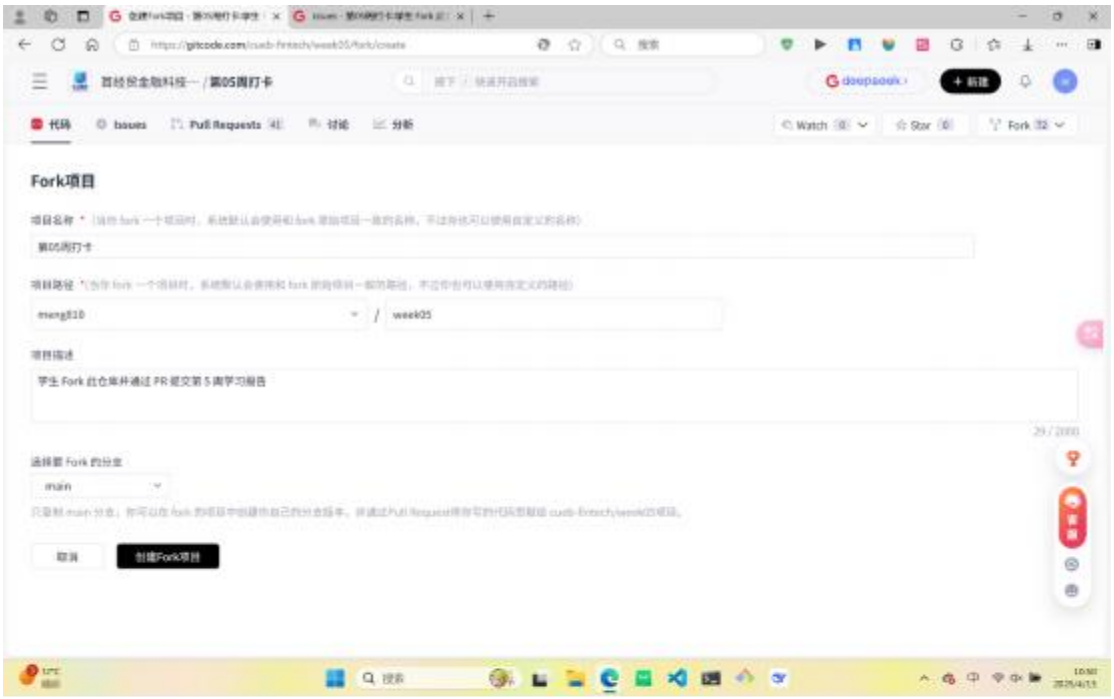
依赖冲突解决方案

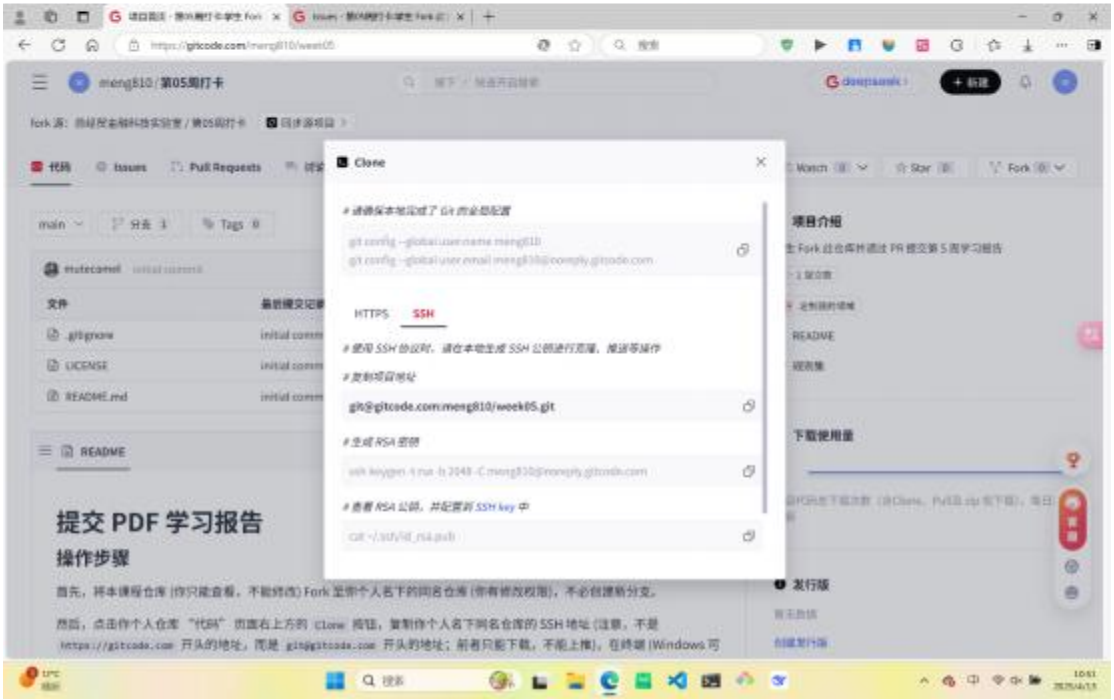
使用conda管理科学计算包

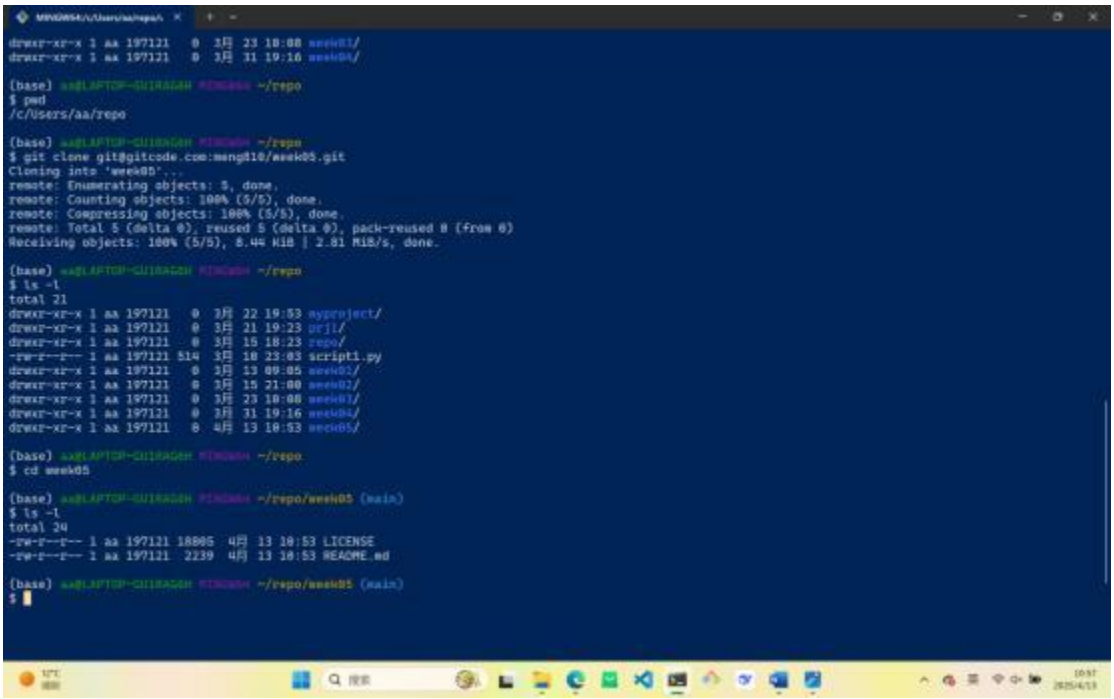
通过docker容器隔离不同项目环境

八、学习路线图建议

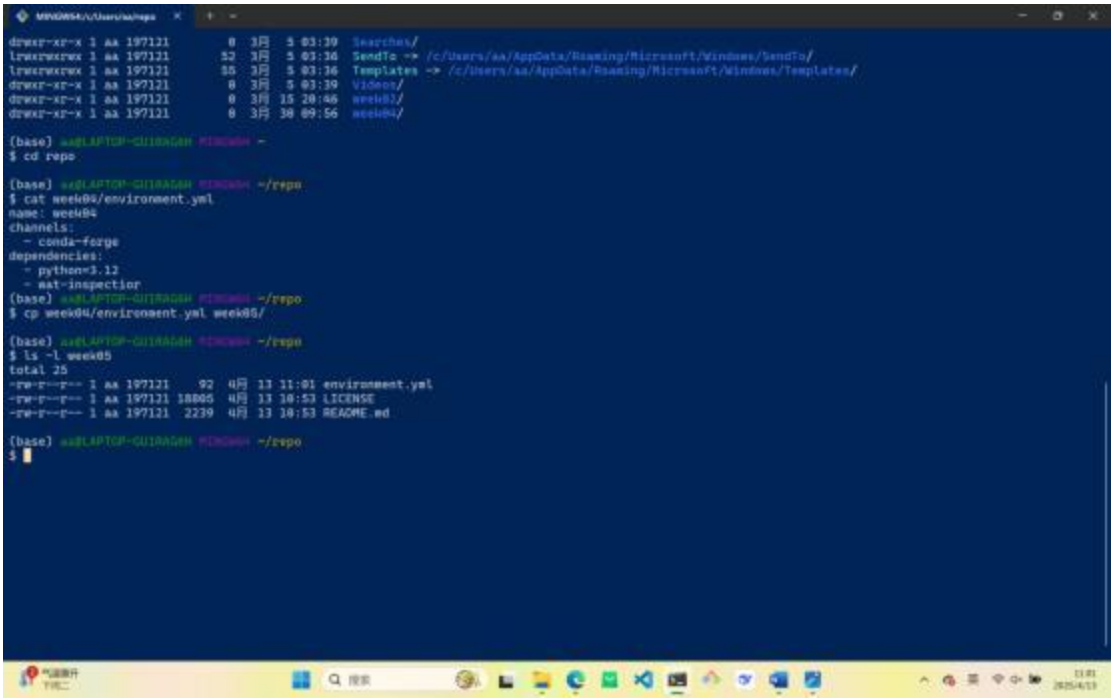
基础阶段（2周）


Fork项目
meng810
week05
main
取消
创建Fork项目

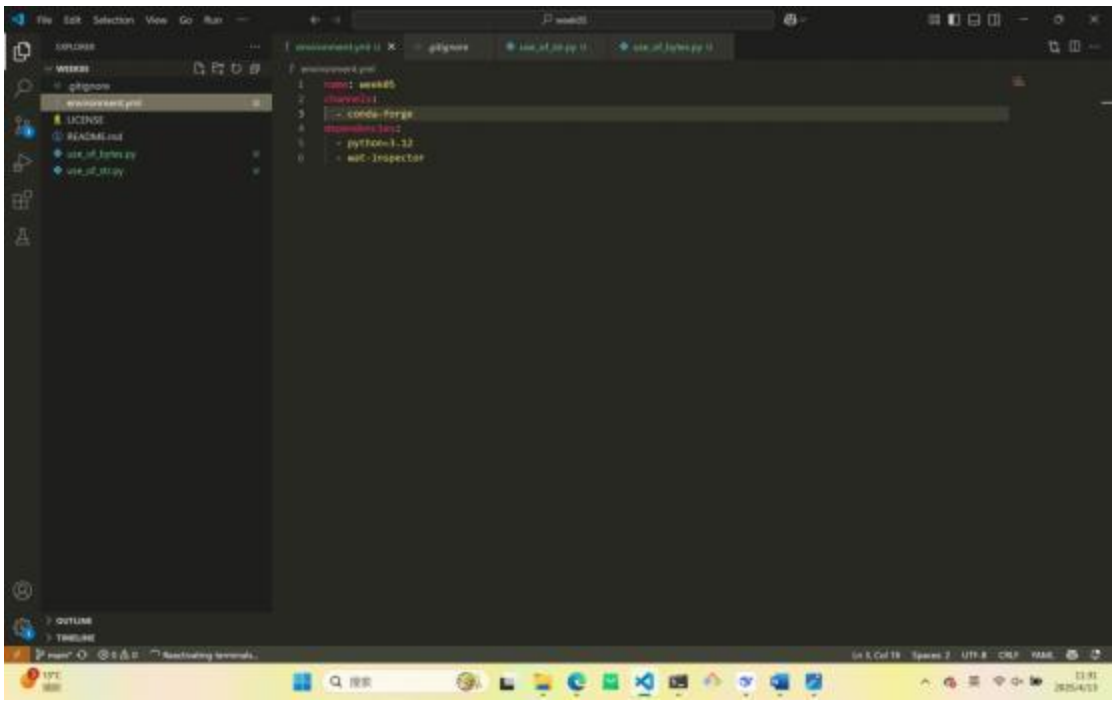

meng810 / 第05周打卡
Clone
HTTPS
SSH
git@gitcode.com:meng810/week05.git
提交 PDF 学习报告
操作步骤



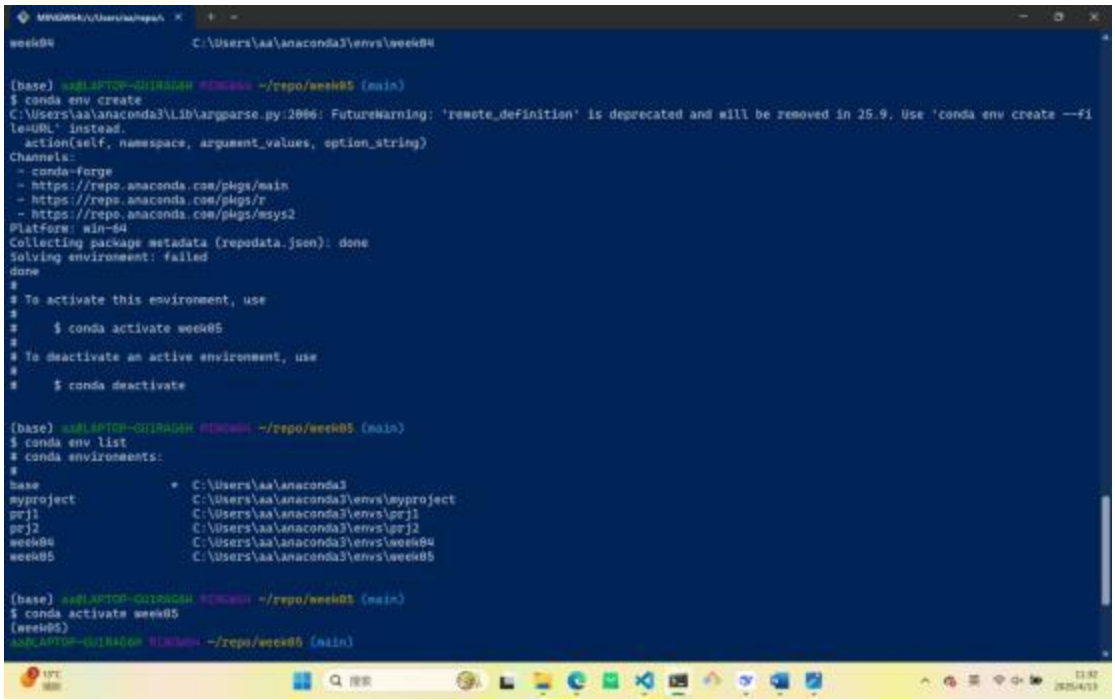
2.把 week04 里 environment.yml 的内容复制到 week05 里



用 VS Code 打开项目目录，新建一个 environment.yml 文件，指定安装 Python 3.12

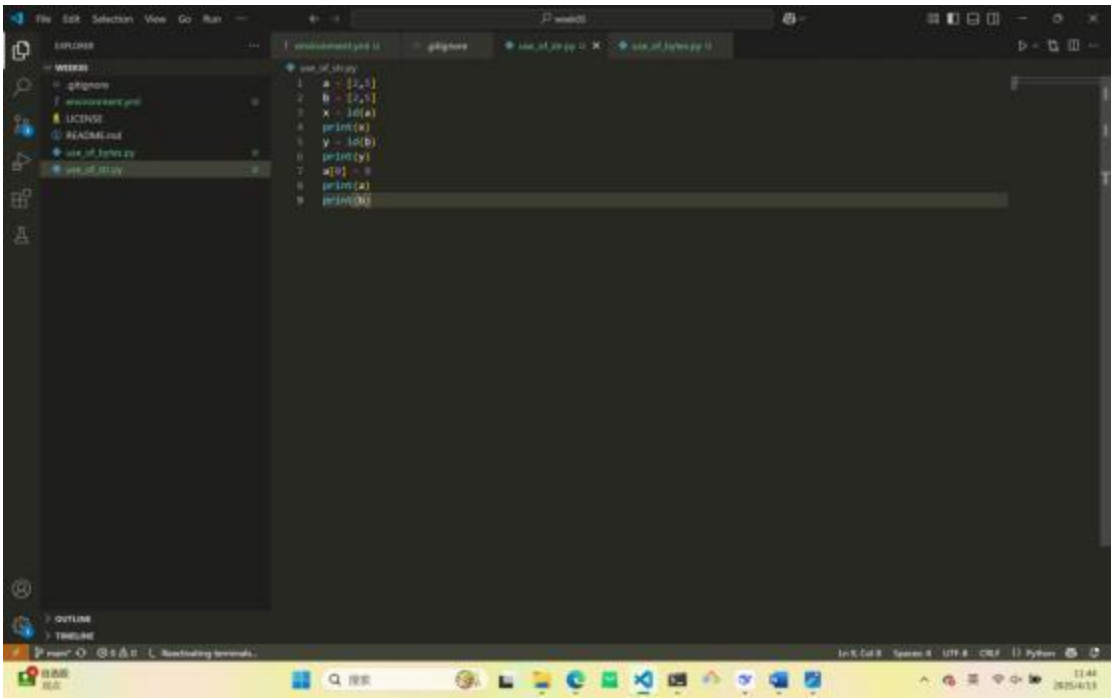


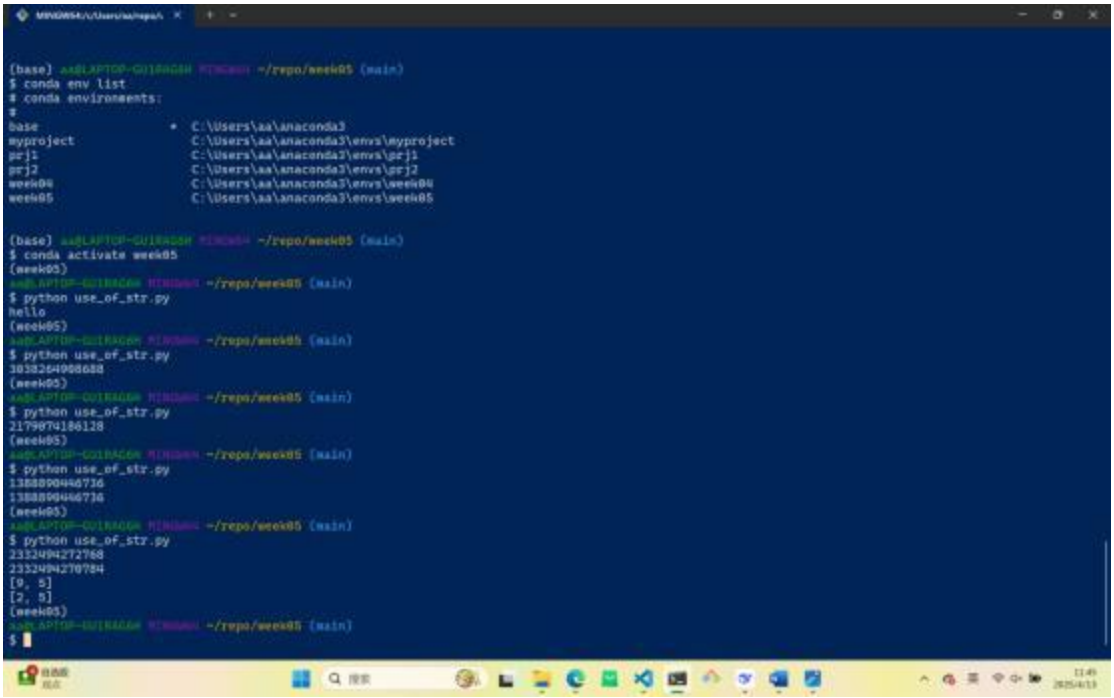
运行 conda env create 命令创建 Conda 环境



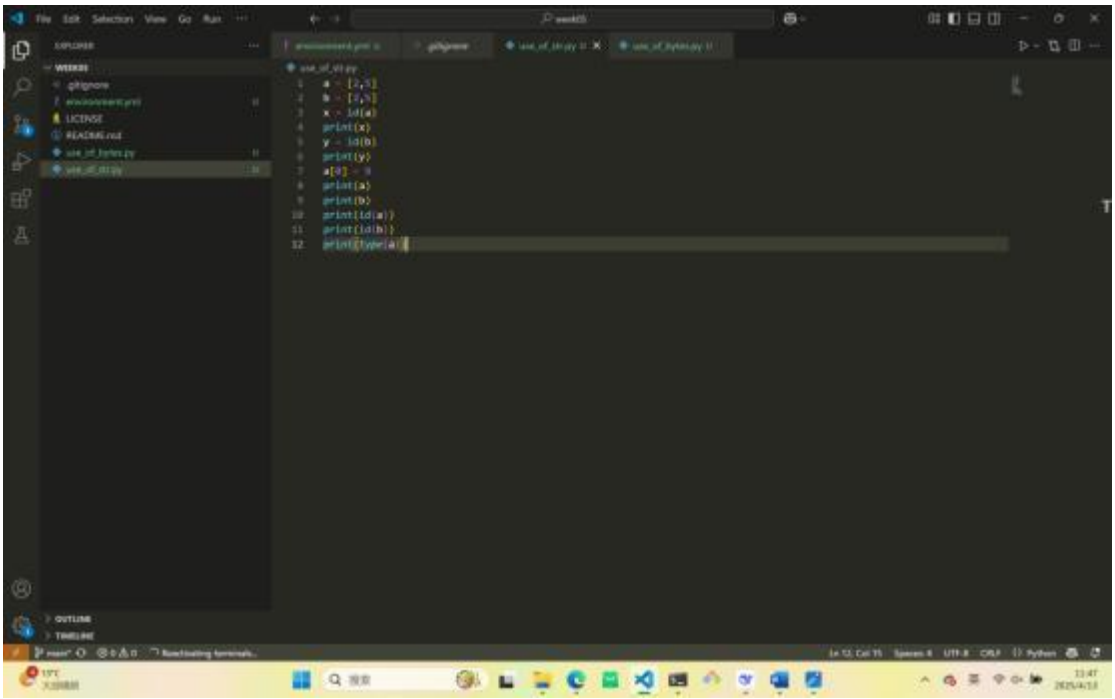
3.逐个创建 use_of_{name}.py 文件，其中 {name} 替换为上述要求掌握的对象类型

id() -- 返回对象在虚拟内存中的地址（正整数），如果 id(a) == id(b)，那么 a is b (is 是个运算符



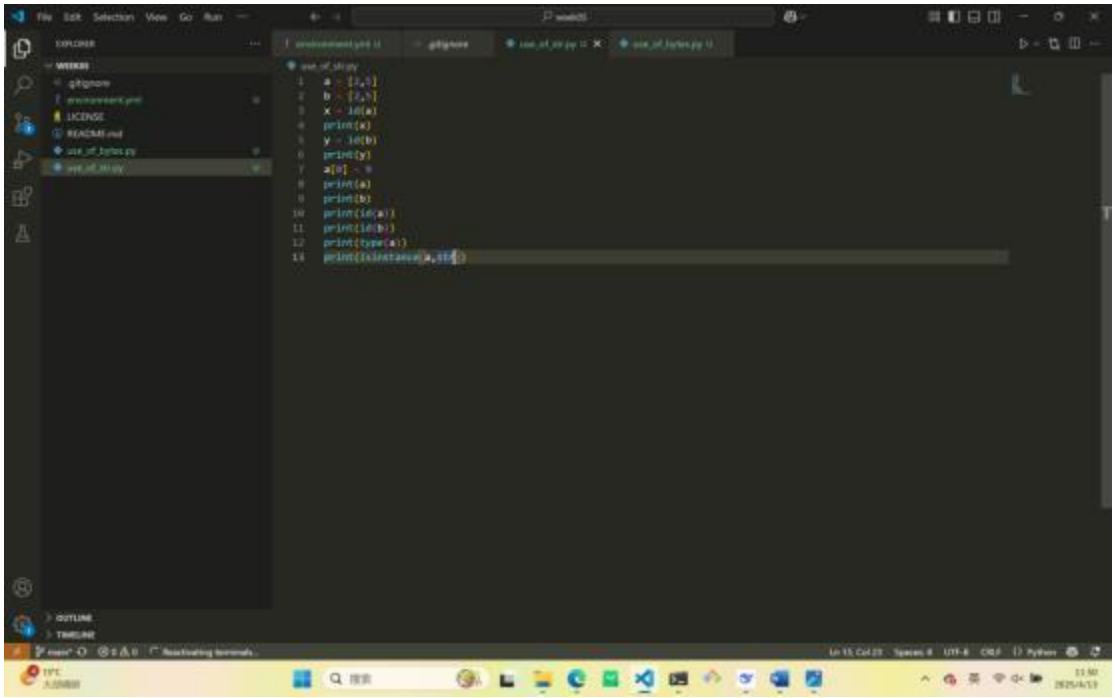


type() -- 返回对象的类型



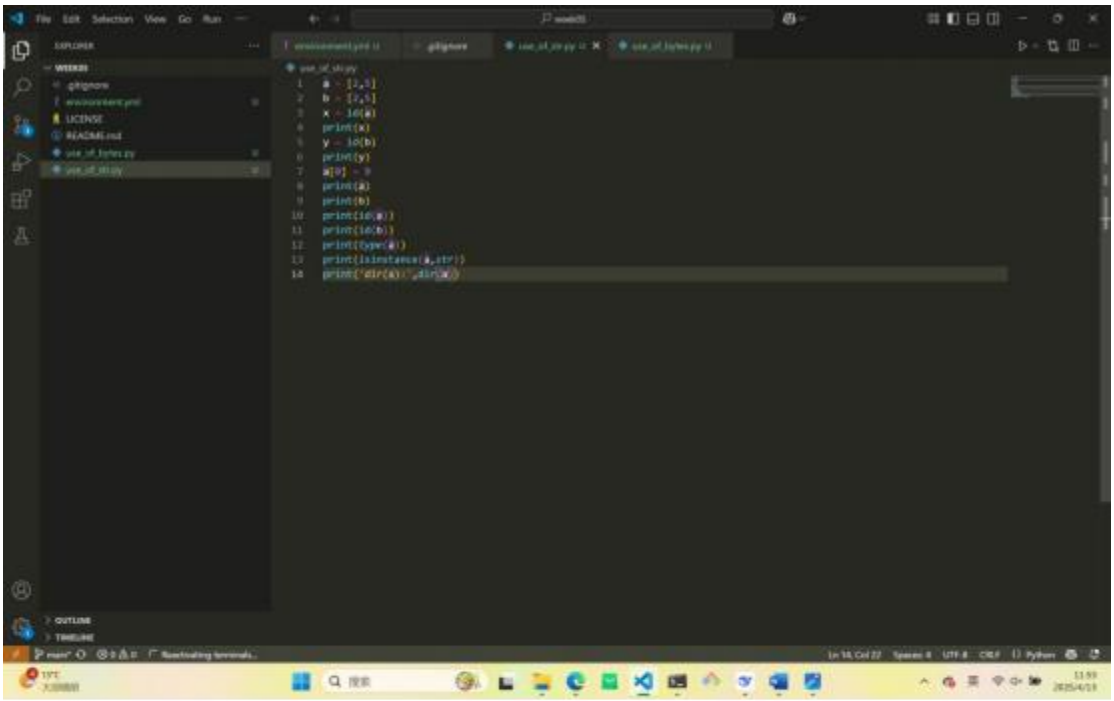

```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$ python use_of_str.py
2746361714944
2746361712960
[9, 5]
[2, 5]
2746361714944
2746361712960
<class 'list'>
(week05)
```

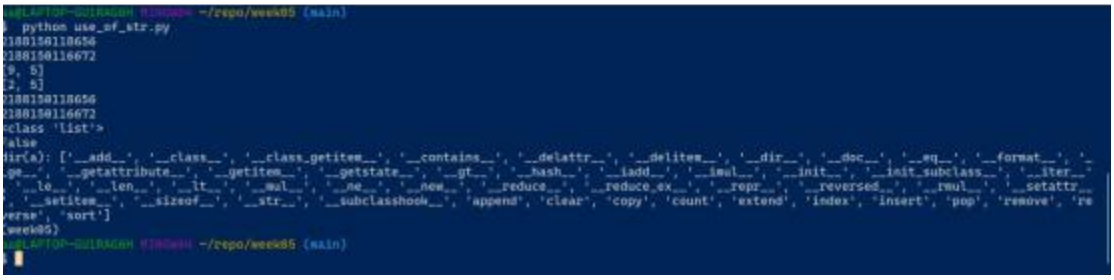
isinstance() -- 判断对象是否属于某个（或某些）类型



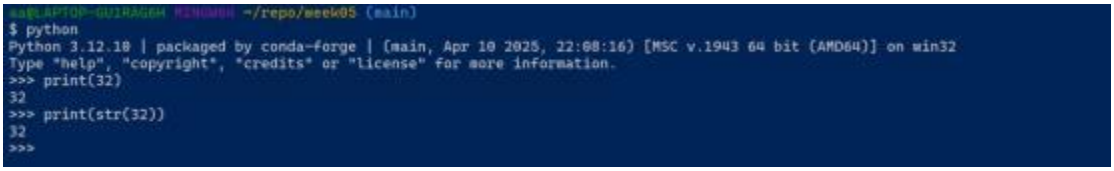
```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$ python use_of_str.py
2075930138880
2075930136896
[9, 5]
[2, 5]
2075930138880
2075930136896
<class 'list'>
False
(week05)
```

dir() -- 返回对象所支持的属性（attributes）的名称列表



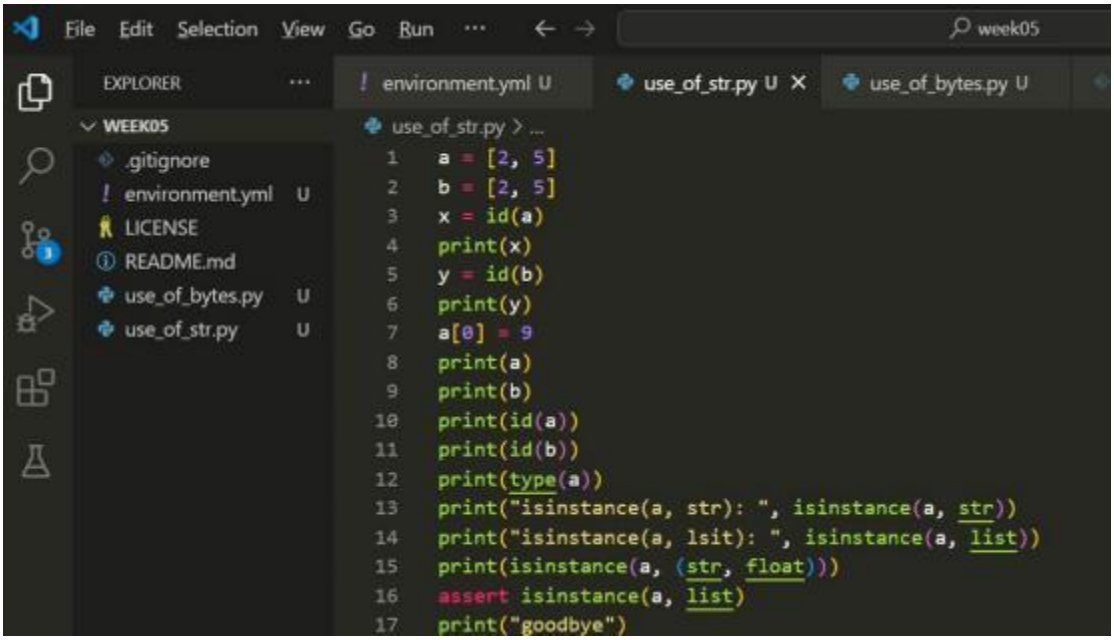


str() -- 返回对象 print 时要显示在终端的字符串

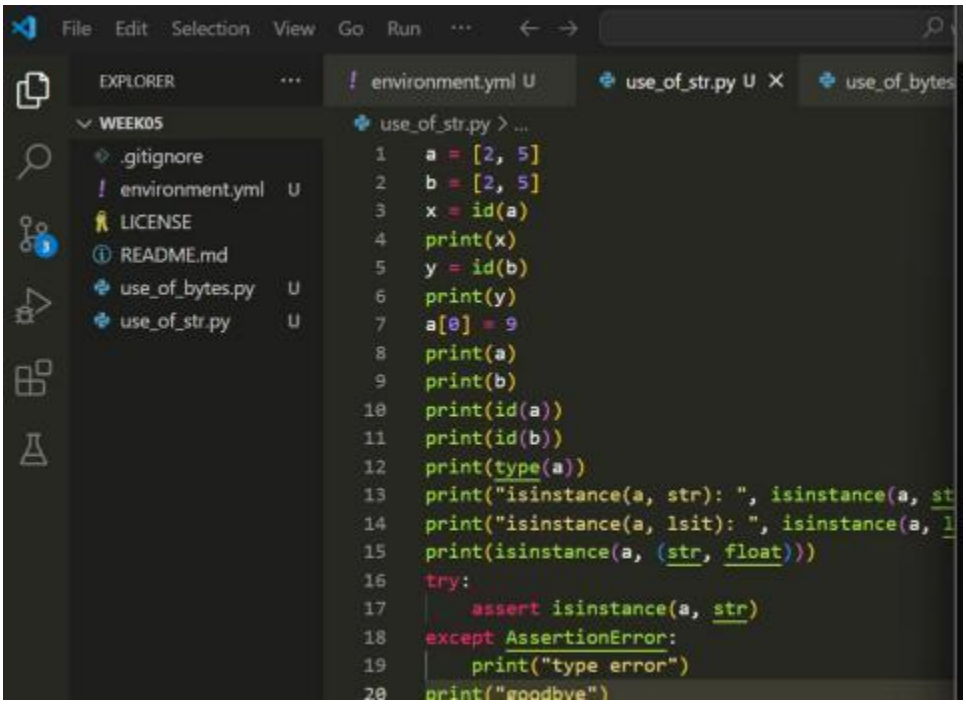


可以调用 print() 函数将表达式（expression）输出到终端，查看结果是否符合预期

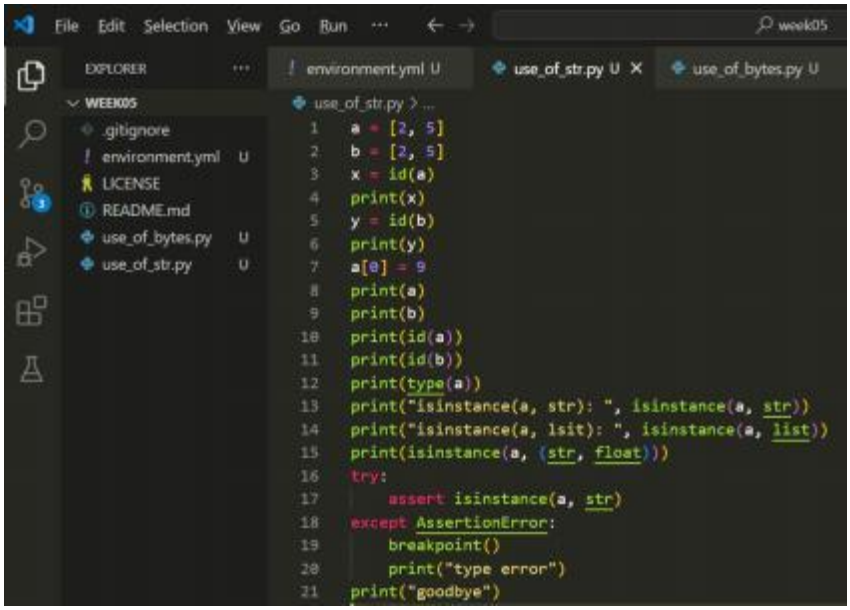
可以利用 assert 语句查验某个表达式（expression）为真，否则报错（AssertionError）退出



可以利用 try 语句拦截报错，避免退出，将流程（flow）转入 except 语句

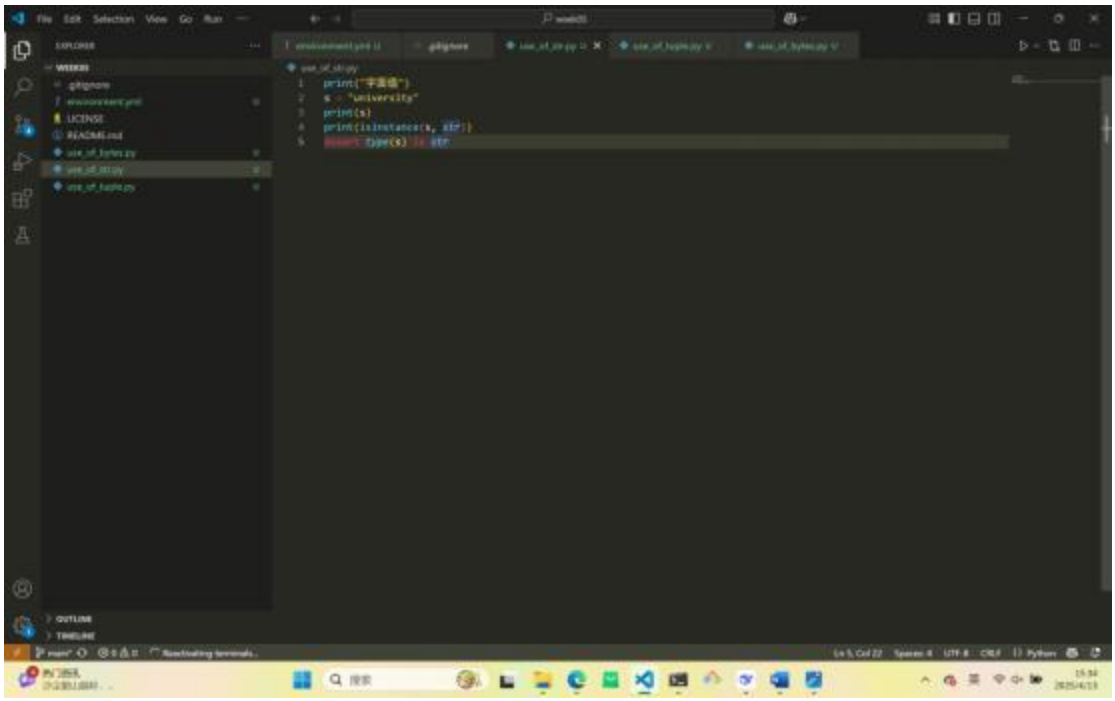


可以调用 breakpoint() 函数暂停程序运行，进入 pdb 调试（debug）模式

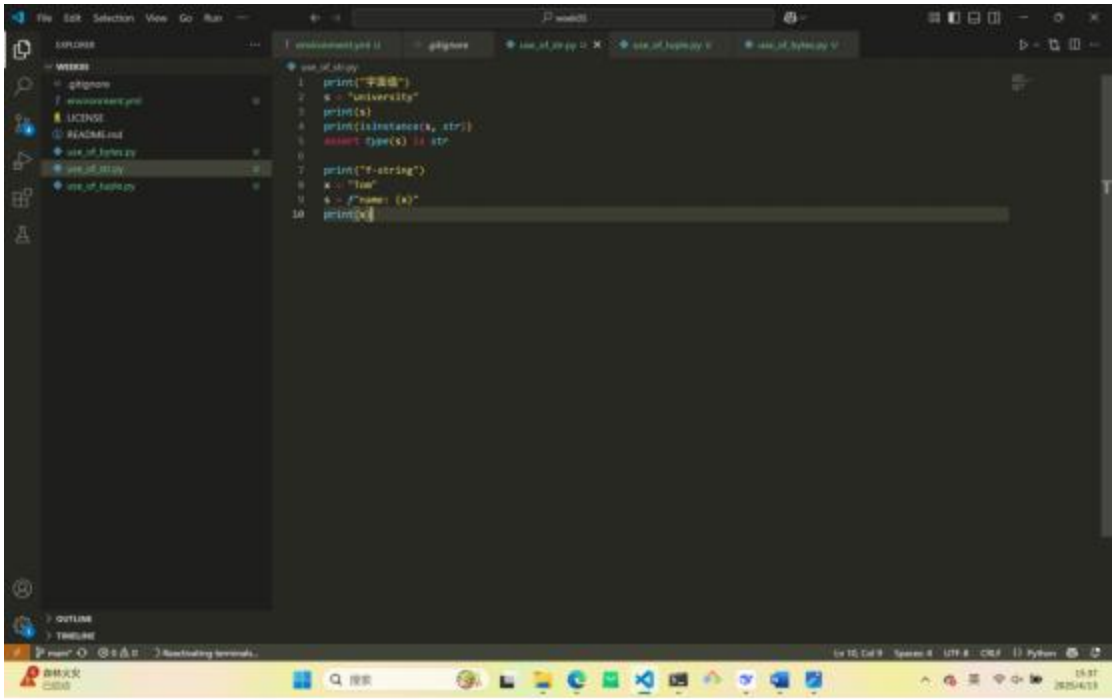


4.对于 每一个 上述要求掌握的对象类型 (将来遇到新的对象类型也应该如此)，我们首先应该熟悉如何通过 表达式 (expression) 得到他们的 实例 (instance)，一般包括以下途径:

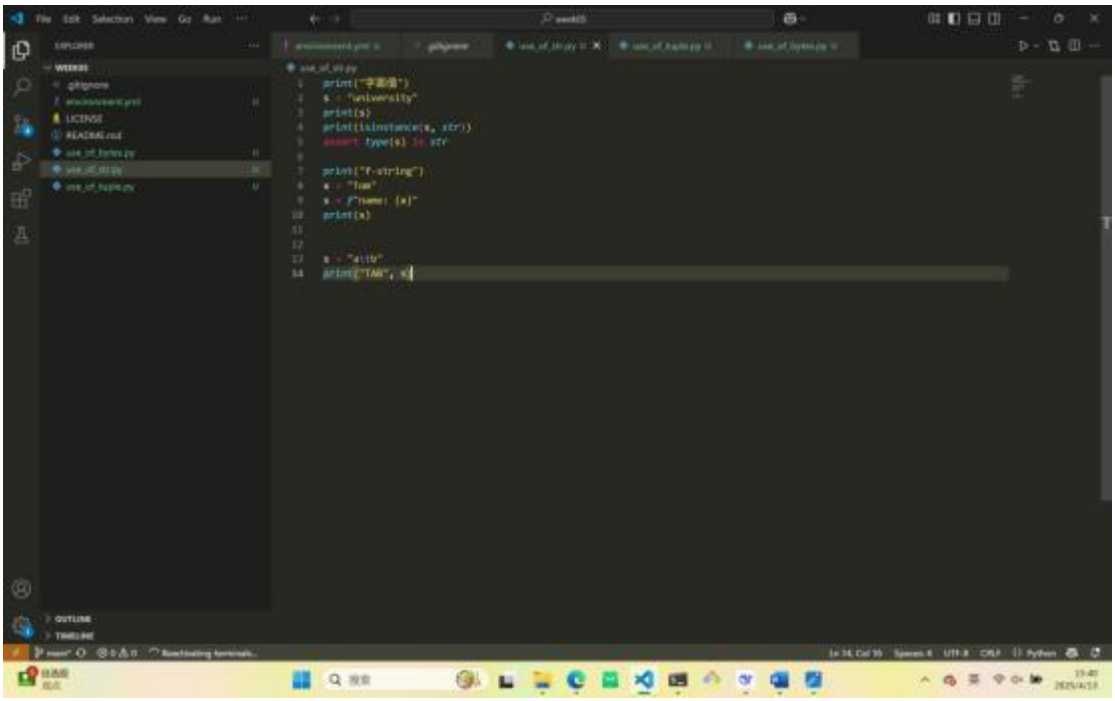
字面值 (literal) (包括 f-string 语法)



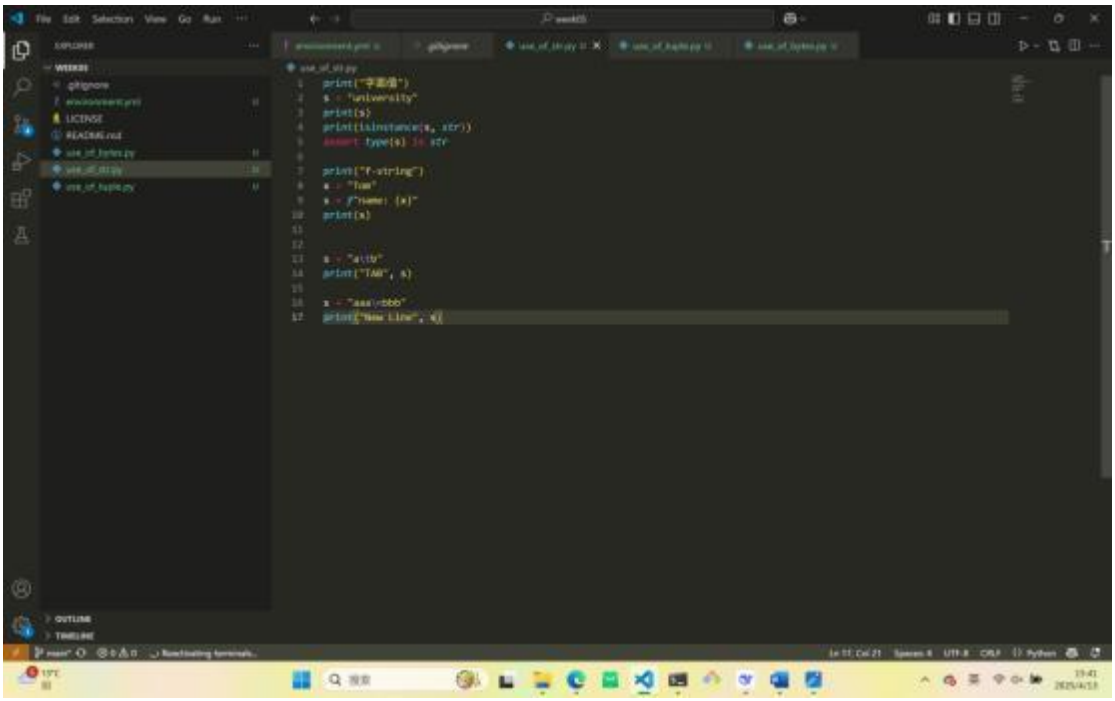
```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$  python use_of_str.py
字面值
university
True
(week05)
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$
```



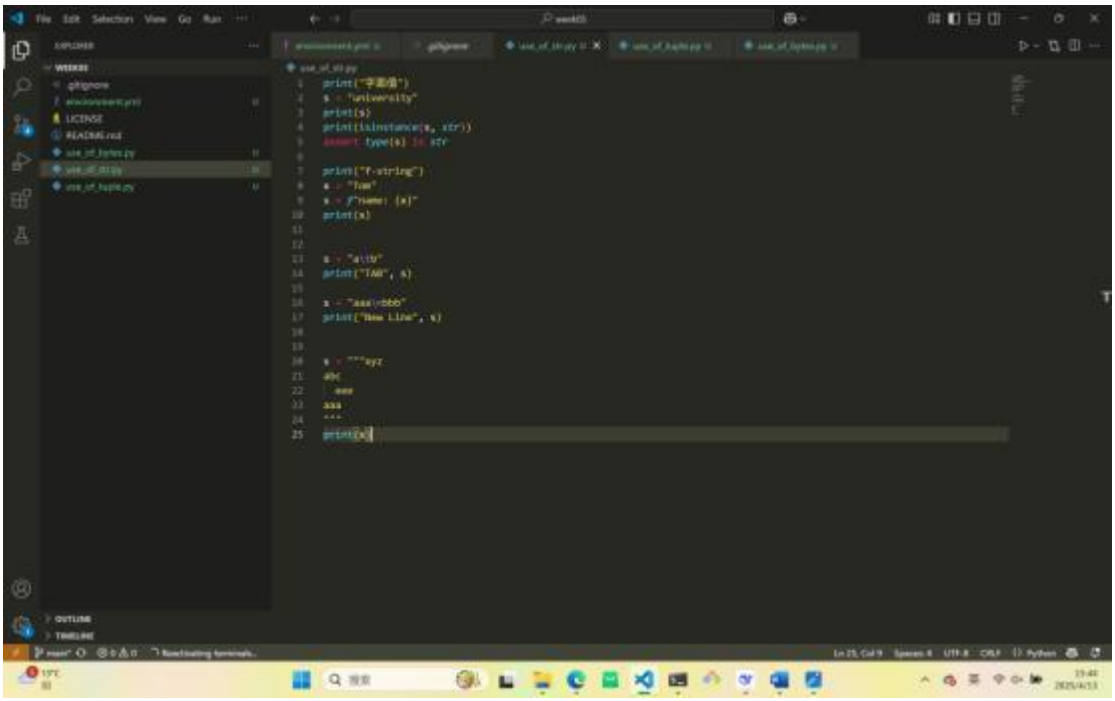

```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$ python use_of_str.py
字面值
university
True
f-string
name: Tom
(week05)
```




```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$ python use_of_str.py
字面值
university
True
f-string
name: Tom
TAB a	b
(week05)
```

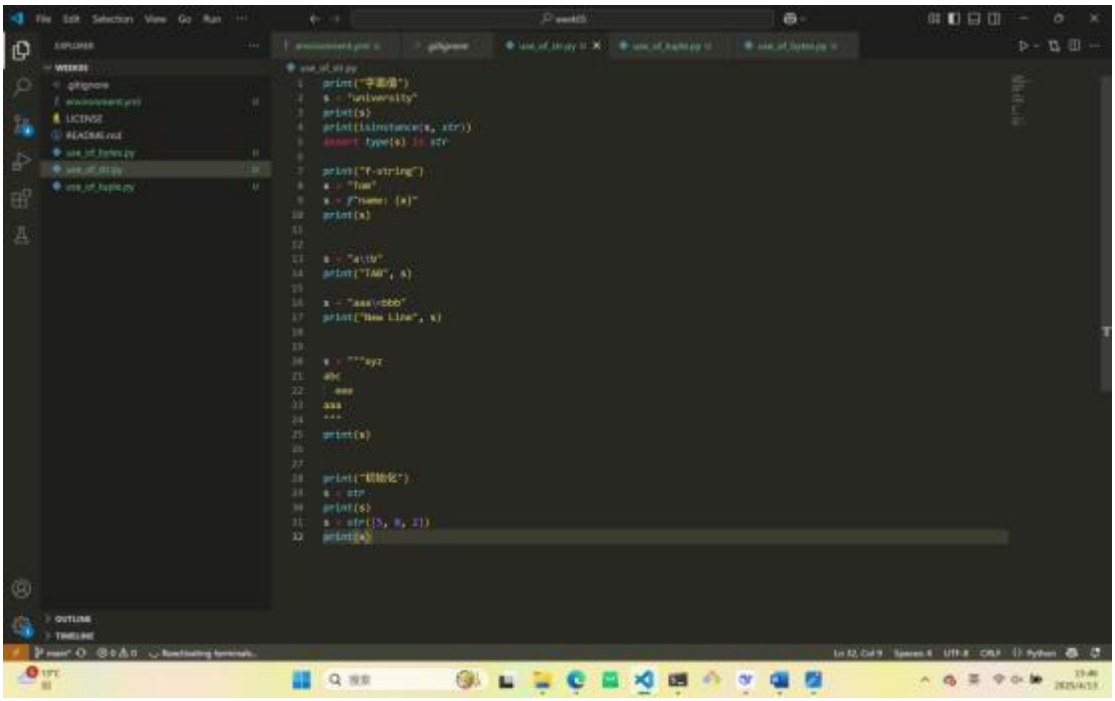



```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$ python use_of_str.py
字面值
university
True
f-string
name: Tom
TAB a	b
New Line aaa
bbb
(week05)
```

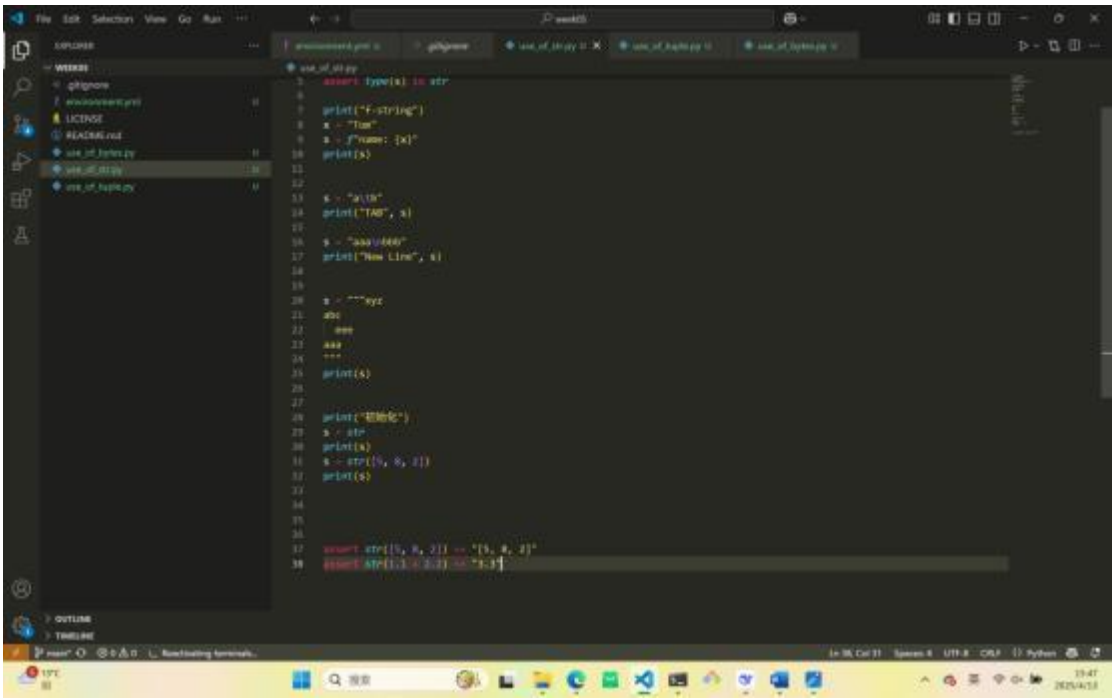



```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$ python use_of_str.py
字面值
university
True
f-string
name: Tom
TAB a    b
New Line aaa
bbb
xyz
abc
  eee
aaa
```

初始化（init）

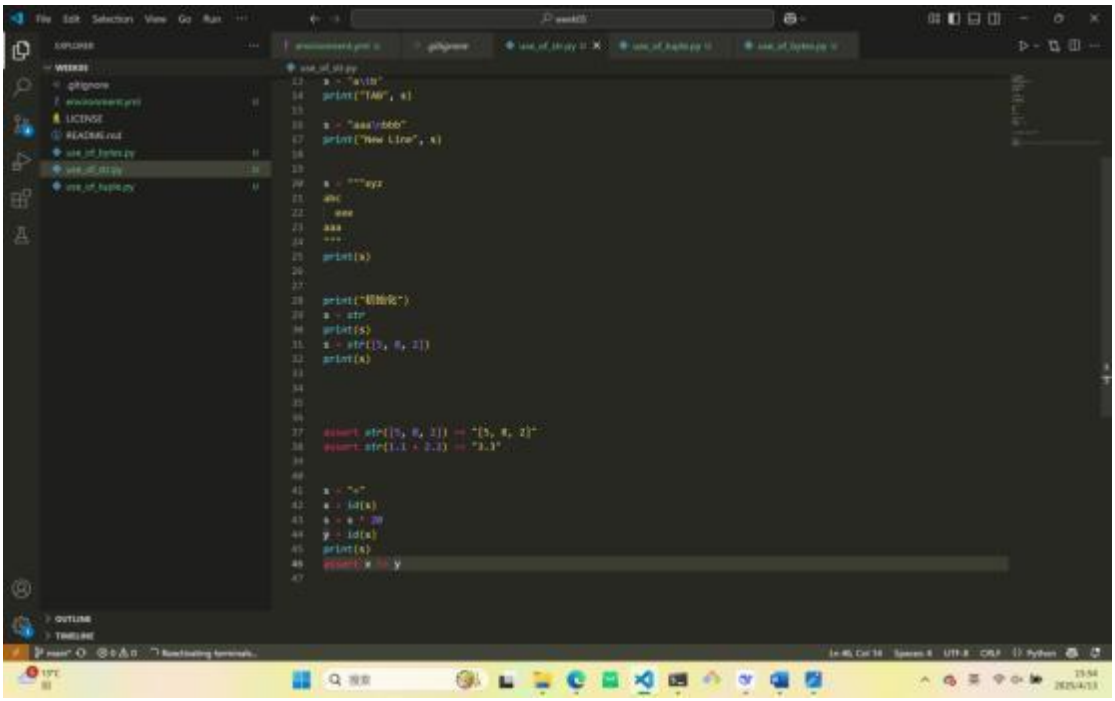



```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$ python use_of_str.py
字面值
university
True
f-string
name: Tom
TAB a    b
New Line aaa
bbb
xyz
abc
  eee
aaa

初始化
<class 'str'>
[5, 8, 2]
(week05)
```

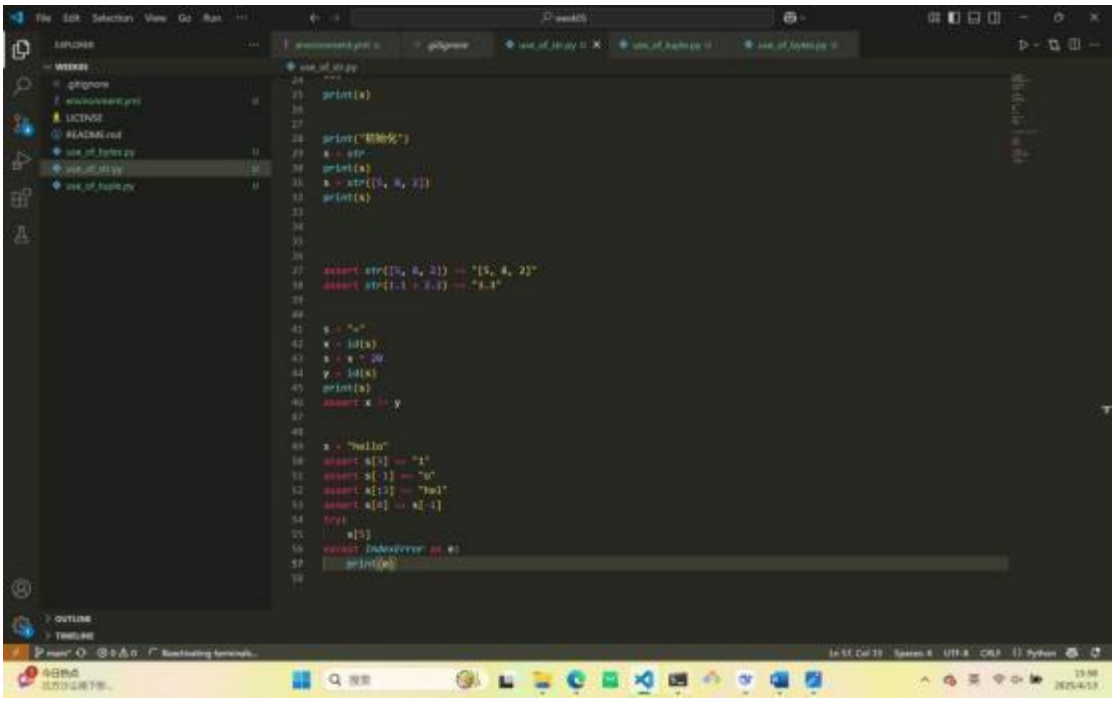


```
aa@LAPTOP-GU1RAG6H MINGW64 ~/repo/week05 (main)
$ python use_of_str.py
字面值
university
True
f-string
name: Tom
TAB a	b
New Line aaa
bbb
xyz
abc
  eee
aaa

初始化
<class 'str'>
[5, 8, 2]
Traceback (most recent call last):
  File "C:\Users\aa\repo\week05\use_of_str.py", line 38, in <module>
    assert str(1.1 + 2.2) == "3.3"
           ^^^^^^^^^^^^^^^^^^^^^^^^
AssertionError
(week05)
```

运算值（operator)



索引值 (subscription)



```
 42     s = "hello"
 43     assert s[3] == "1"
 44     assert s[-1] == "o"
 45     assert s[:3] == "hel"
 46     assert s[4] == s[-1]
 47     try:
 48         s[5]
(Pdb)
 49     except IndexError as e:
 50         print(e)
```

返回值

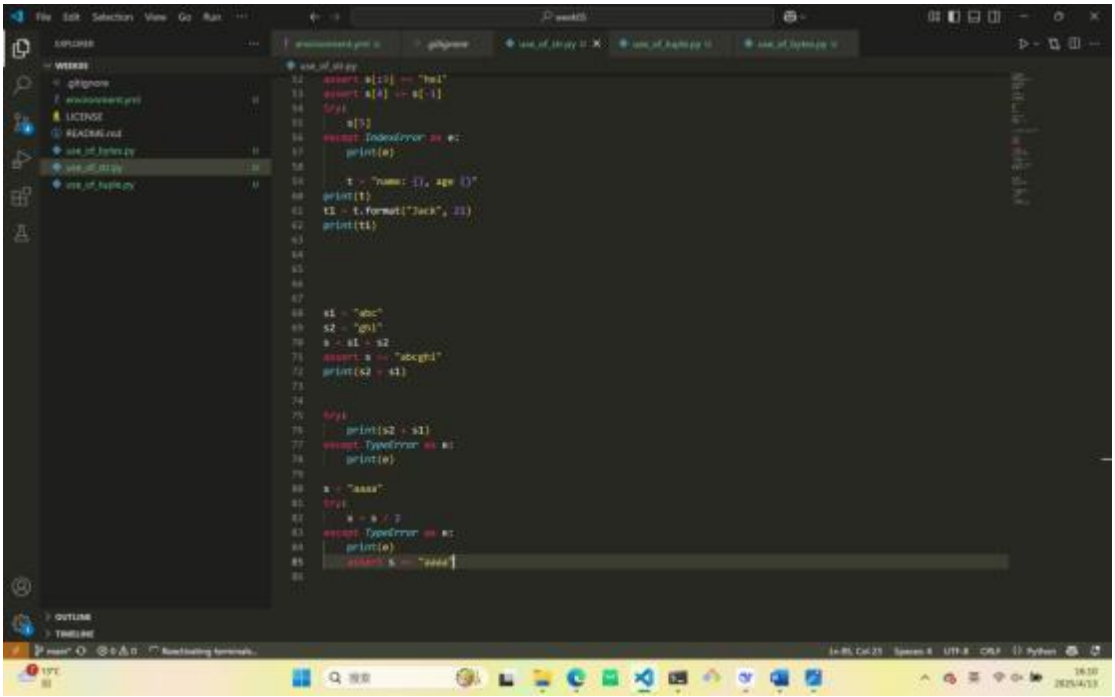
```
    t = "name: {}, age {}"
print(t)
t1 = t.format("Jack", 21)
print(t1)
```

5.对于每一个上述要求掌握的对象类型（将来遇到新的对象类型也应该如此），我们也要尝试验证其以下几个方面的 属性（attributes):

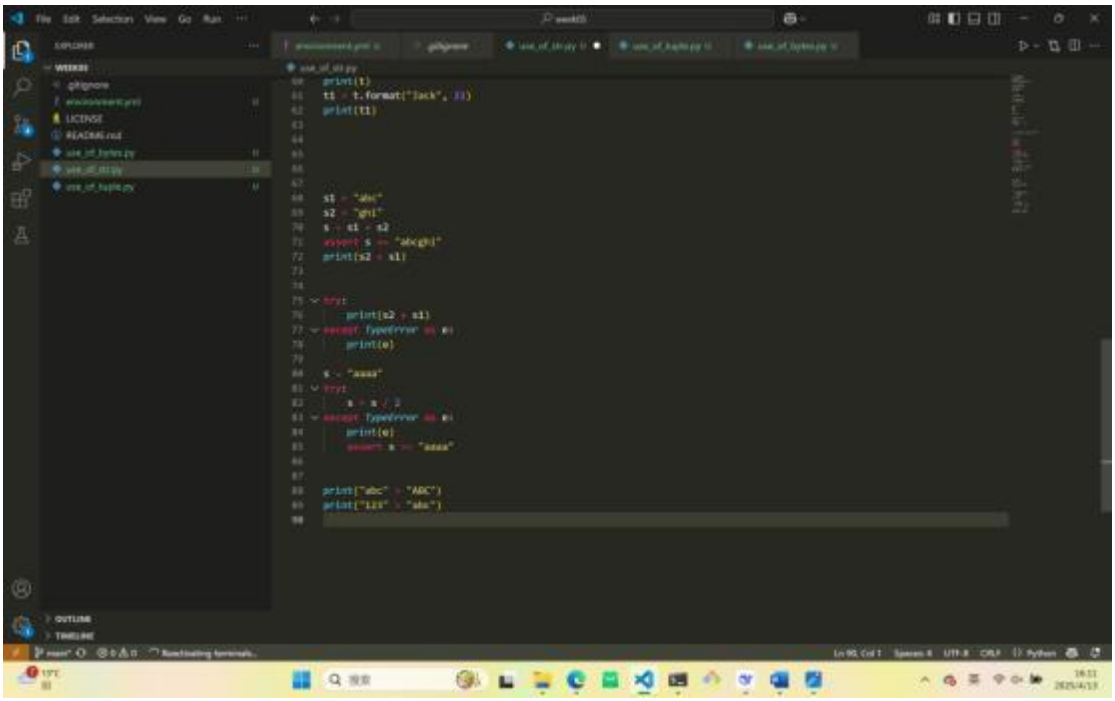
对数学运算符（+、-、*、/、//、%、@）有没有支持

```python
s1 = "abc"
s2 = "ghi"
s = s1 + s2
assert s == "abcghi"
print(s2 + s1)


try:
    print(s2 + s1)
except TypeError as e:
    print(e)

s = "aaaa"
try:
    s = s / 2
except TypeError as e:
    print(e)
```

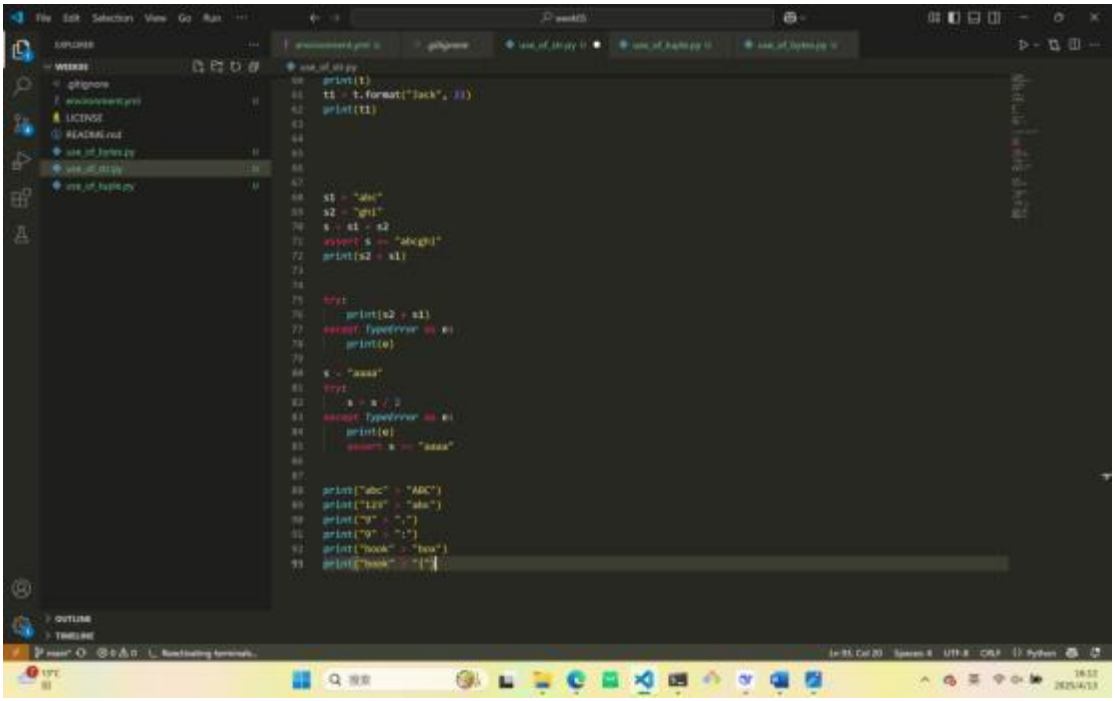
如何判断相等（==）



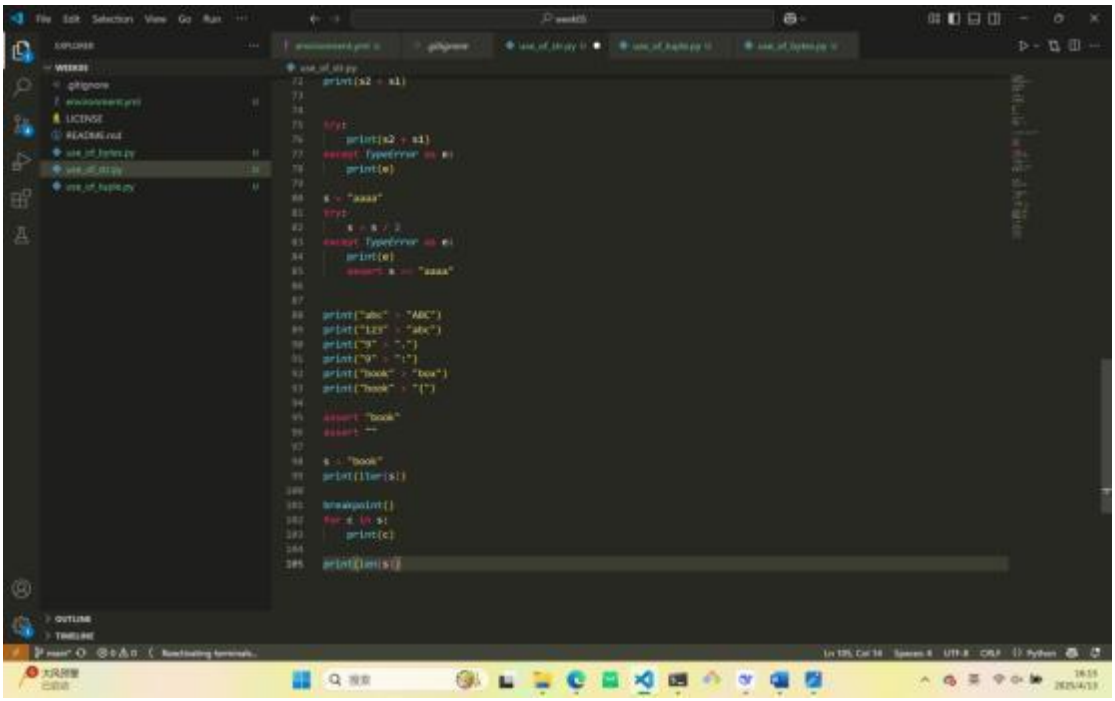
对于比较运算符（> 、= 、<=）有没有支持



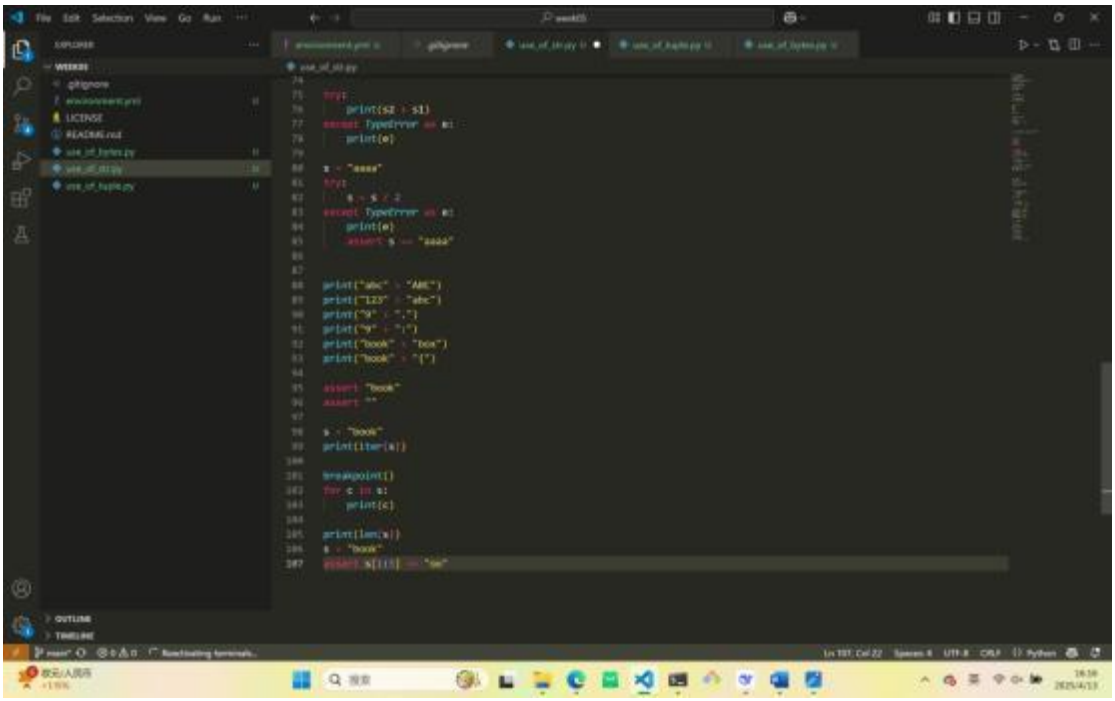
什么值被当作 True，什么值被当作 False



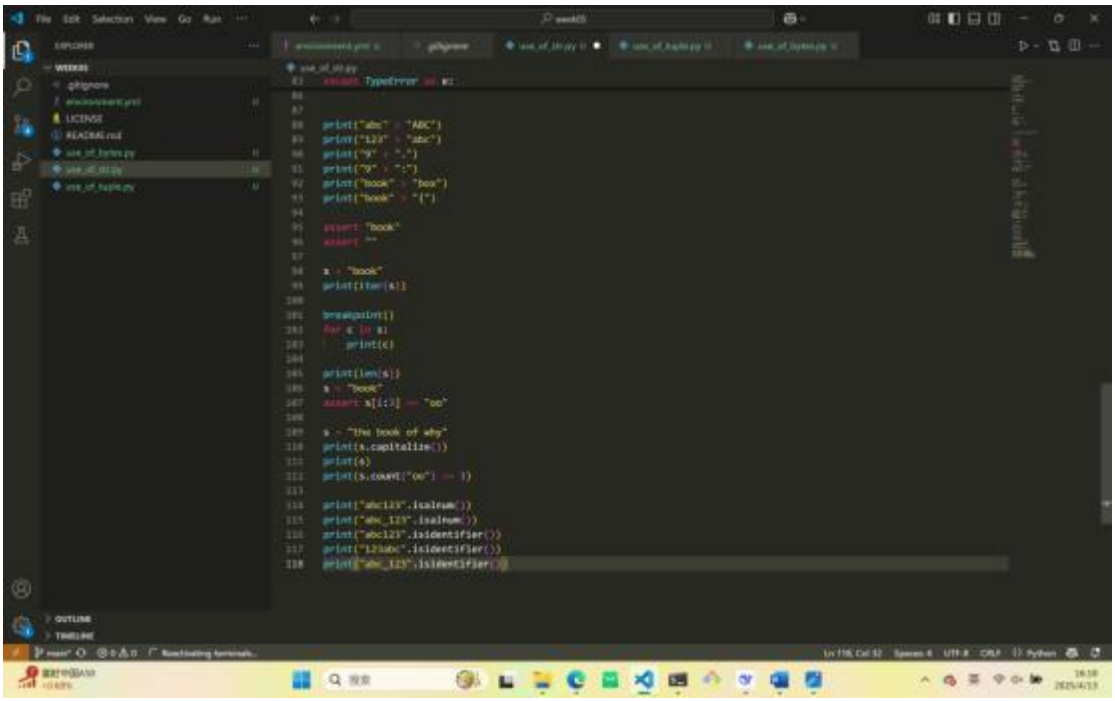
是否支持返回长度（len）

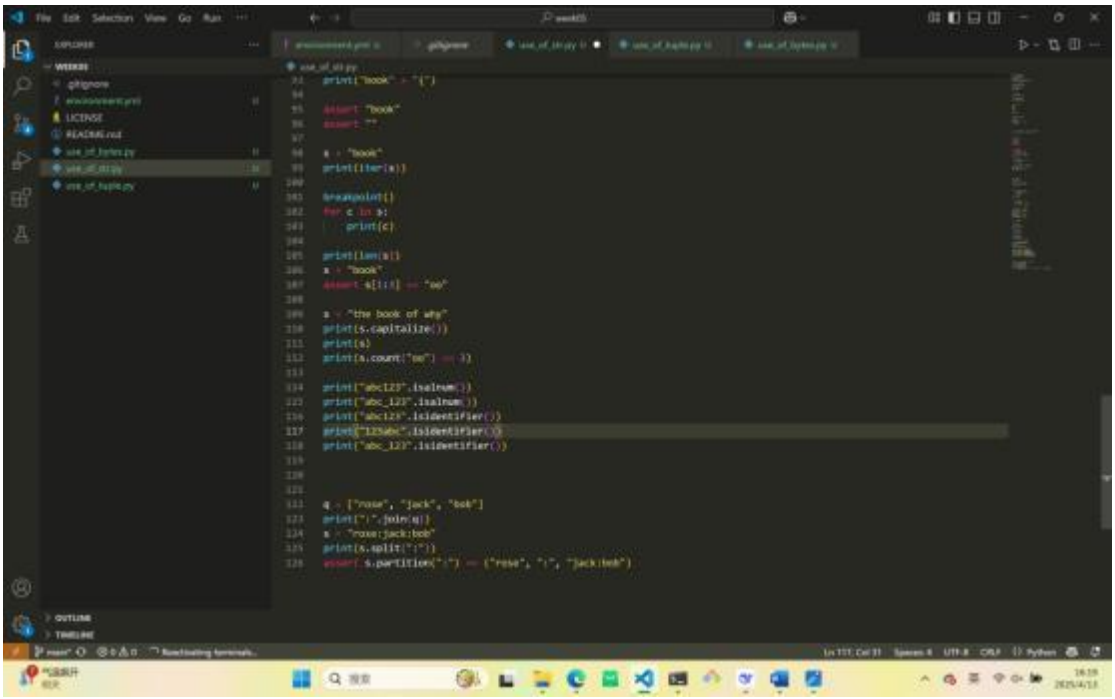


是否（如何）支持索引操作（subscription)（[] 运算符）



拥有哪些常用方法（method）可供调用（() 运算符）





6、逐个创建 use_of_{name}.py 文件，例如 use_of_bytes.py:

6.1 字节和返回长度 (len)

```python
from pathlib import Path

s = b"hello"
print(s)
print(s[0])

p = Path("D:\\Anaconda\\Anaconda3\\envs\\week05\\python.exe"
s = p.read_bytes()
print(len(s))
breakpoint()
```

6.2 字符串编解码

字符串编码得到字节，字节解码得到字符串，编解码方案有很多，

https://wwwh.ascii-code.com，为其中一种。

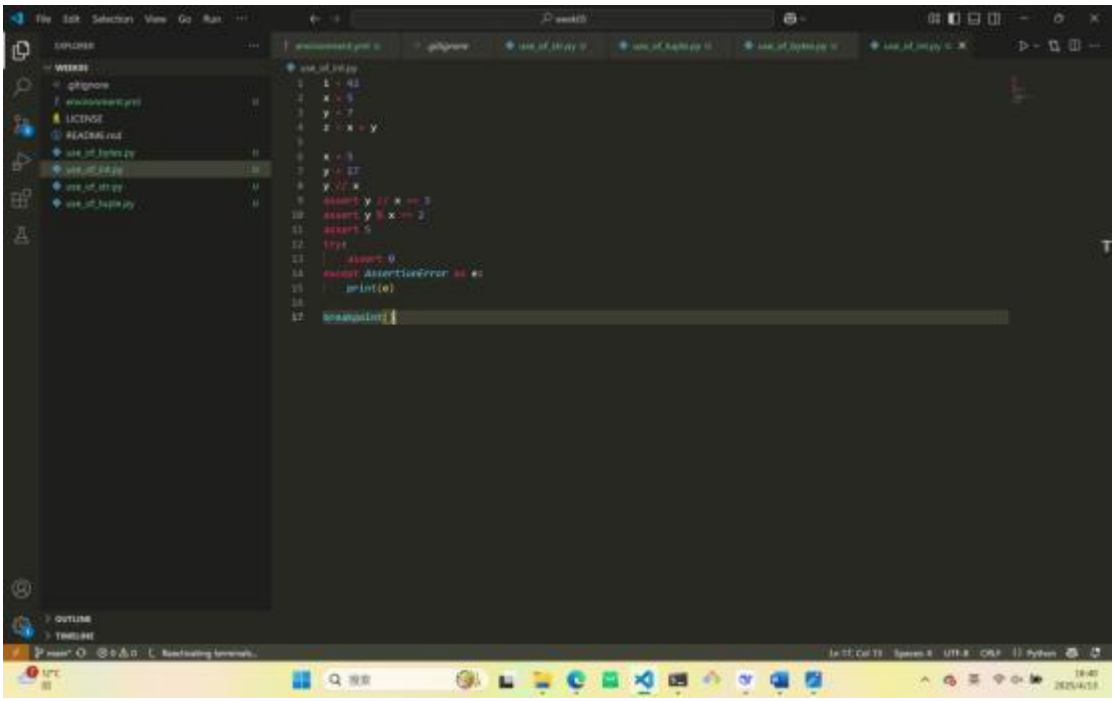
```python
from pathlib import Path

s = b"hello"
print(s)
print(s[0])

p = Path("D:\\Anaconda\\Anaconda3\\envs\\week05\\python.exe"
s = p.read_bytes()
print(len(s))

p = Path("environment.yml")
b = p.read_bytes()
print(b[0])

s = b.decode()
assert isinstance(s, str)
b2 = s.encode()
assert isinstance(b2, bytes)
assert b2 == b

s = "你好"
b = s.encode()
breakpoint()
```

```
$ python use_of_bytes.py
b'hello'
104
93184
110
--Return--
> e:\研究生上课资料\研一下 上课资料\金融编程与计算\week05\use_of
_bytes.py(23)<module>()->None
-> breakpoint()
(Pdb) l
 18     assert isinstance(b2, bytes)
 19     assert b2 == b
 20
 21     s = "你好"
 22     b = s.encode()
```

```
20
21  s = "你好"
22  b1 = s.encode("utf-8")
23  print(b1)
24  b2 = s.encode("gbk")
25  print(b2)
26  breakpoint()
27
```

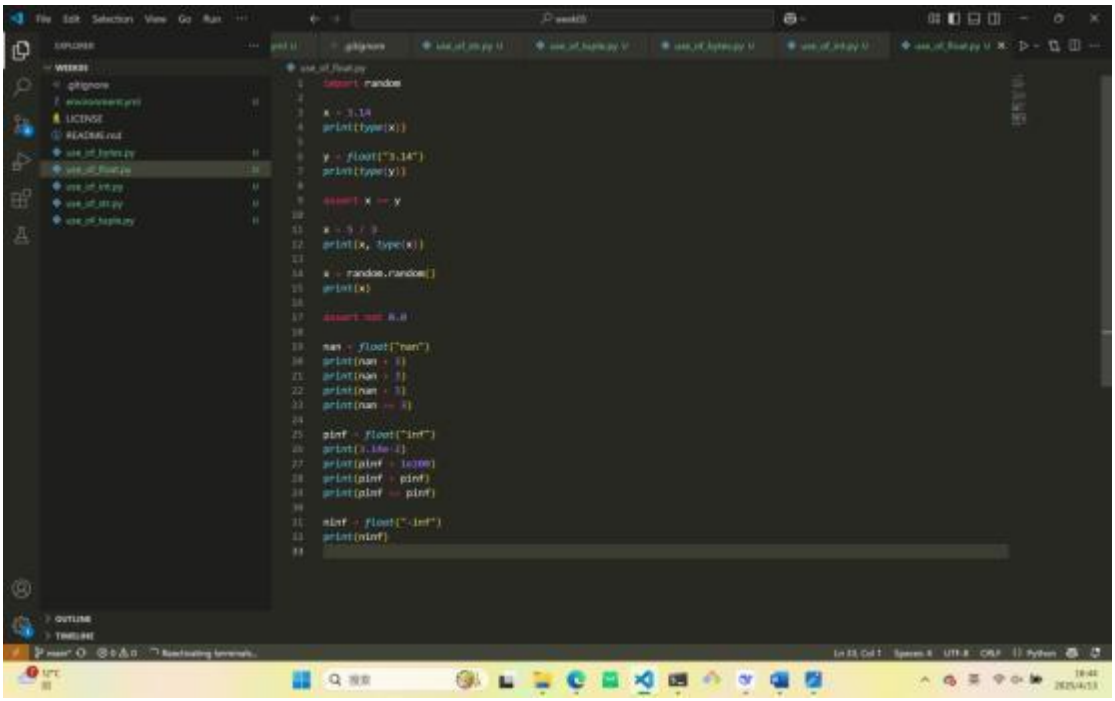
```
use_of_bytes.py > ...
20
21  s = "你好"
22  b1 = s.encode("utf-8")
23  print(b1)
24  b2 = s.encode("gbk")
25  print(b2)
26
27  s = "abc你好🤔"
28  print(s)
29  b = s.encode()
30  breakpoint()
```

7 、创建 use_of_int.py:

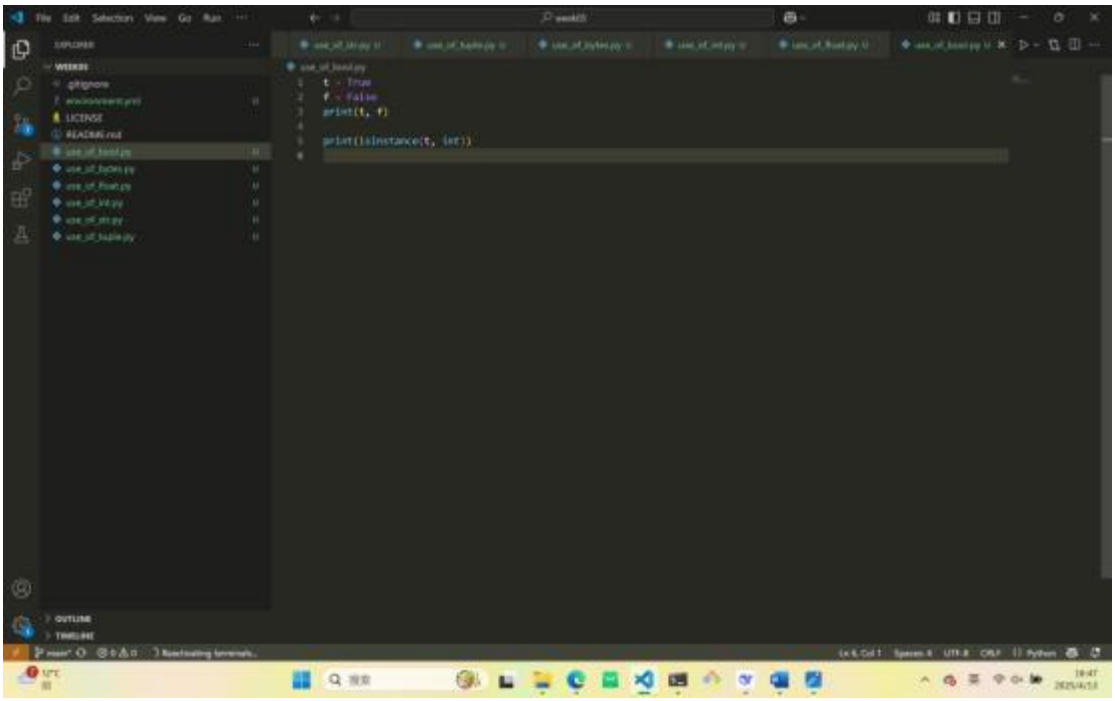


```
(Pdb) for i in x:
*** IndentationError: expected an indented block after 'for' sta
tement on line 1
(Pdb) for i in x: print(i)
*** TypeError: 'int' object is not iterable
(Pdb) p iter(x)
*** TypeError: 'int' object is not iterable
(Pdb) p len(x)
*** TypeError: object of type 'int' has no len()
(Pdb) p x[0]
*** TypeError: 'int' object is not subscriptable
(Pdb)
```

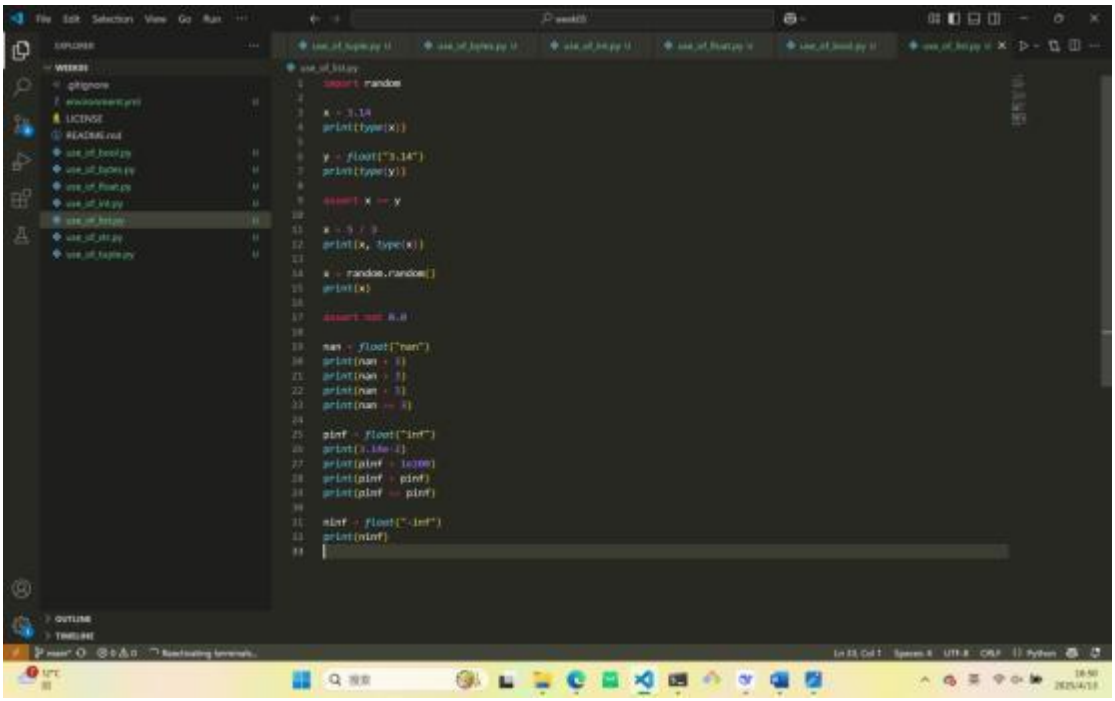
8.创建 use_of_float.py:



9.创建 use_of_bool.py:

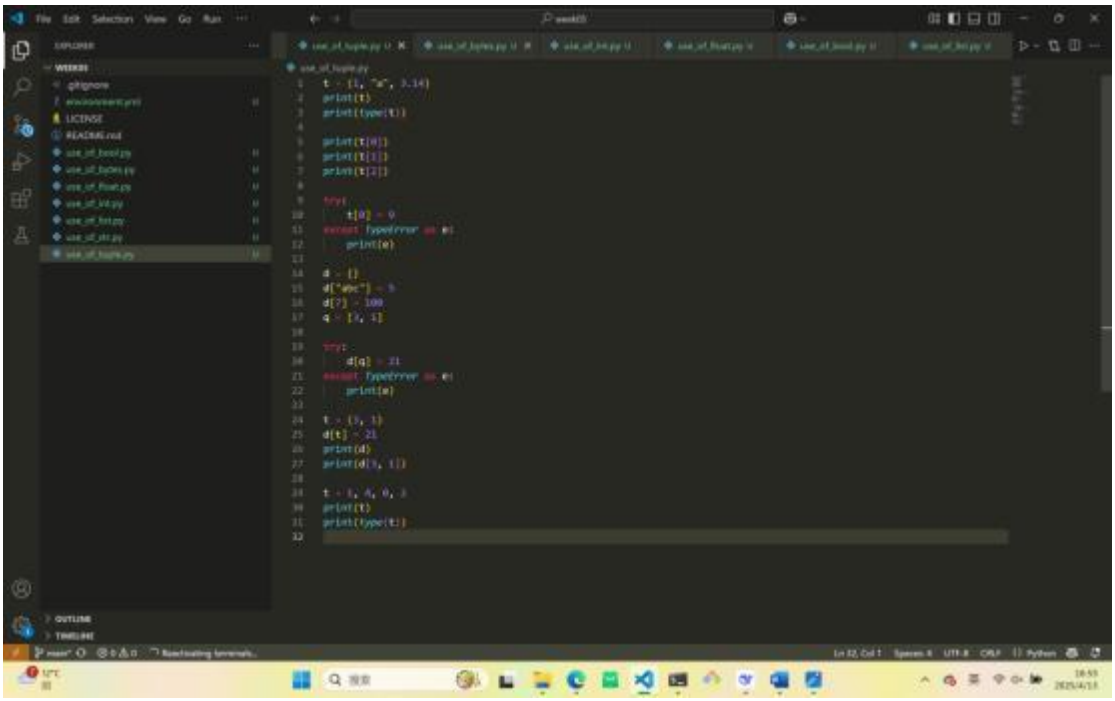


10.创建 use_of_list.py:



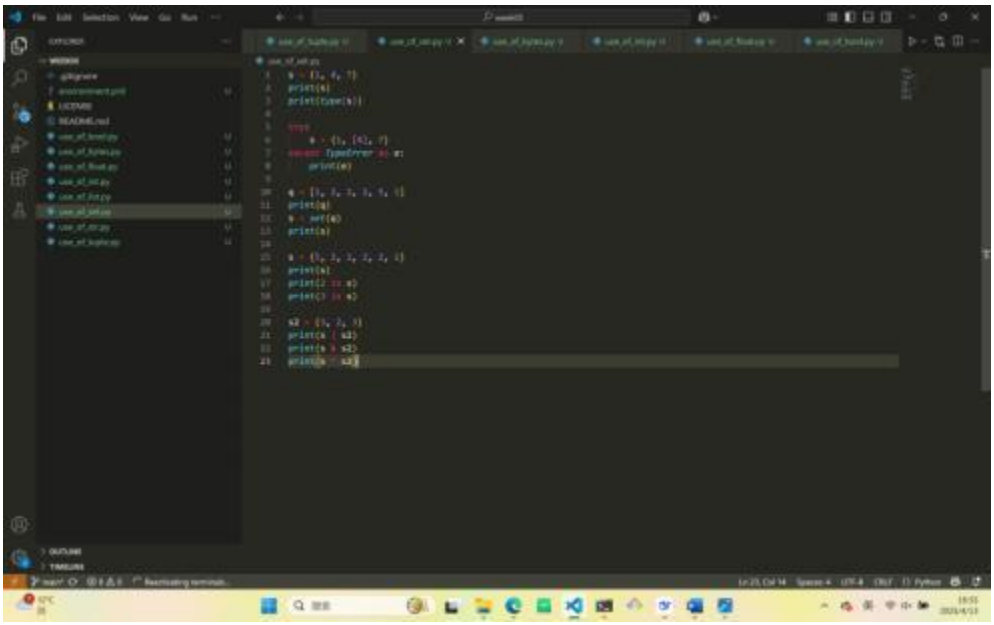
```
$ python use_of_list.py
[1, 5, 'abc']
1
5
abc
list index out of range
abc
b
[2, 5, 'a', 'c']
['a', 'c', 2, 5]
False
[2, 5] [5]
[2, 5, 2, 5, 2, 5]
b=[2, 5, 2, 5, 2, 5]
[9, 5]
[2, 5, 2, 5, 2, 5]
b=[[2, 5], [2, 5], [2, 5]]
[9, 5]
[[9, 5], [9, 5], [9, 5]]
(week05)
```

11.创建 use_of_tuple.py:



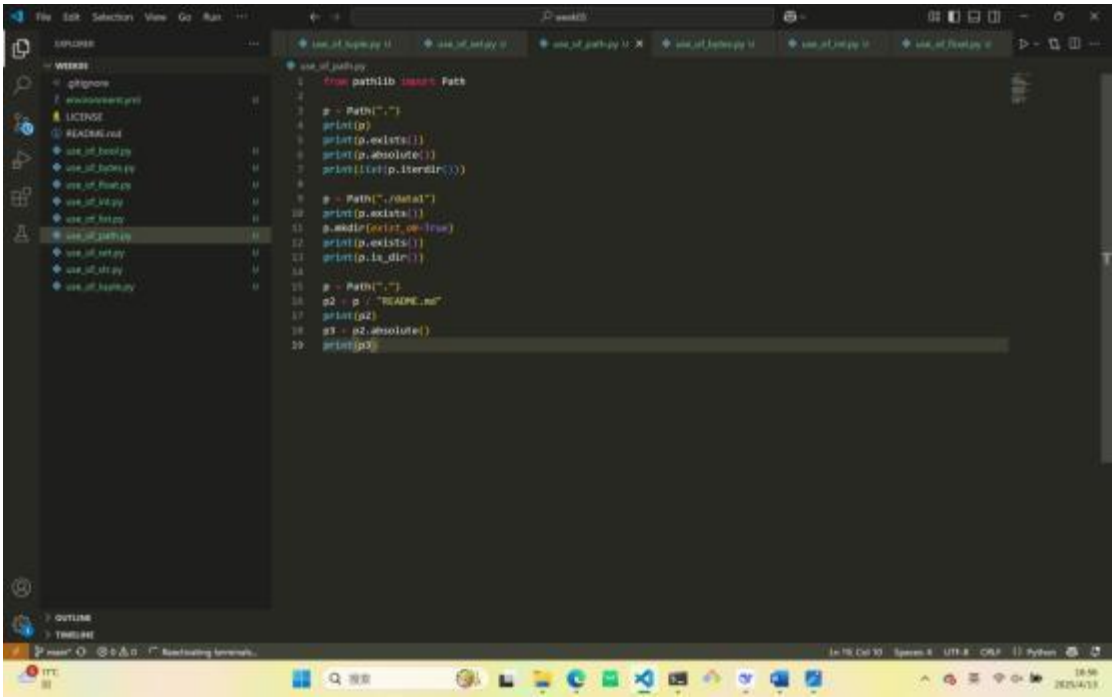
```
$ python use_of_tuple.py
(1, 'a', 3.14)
<class 'tuple'>
1
a
3.14
'tuple' object does not support item assignment
unhashable type: 'list'
{'abc': 5, 7: 100, (3, 1): 21}
21
(1, 4, 0, 2)
<class 'tuple'>
(week05)
```

12.创建 use_of_set.py:



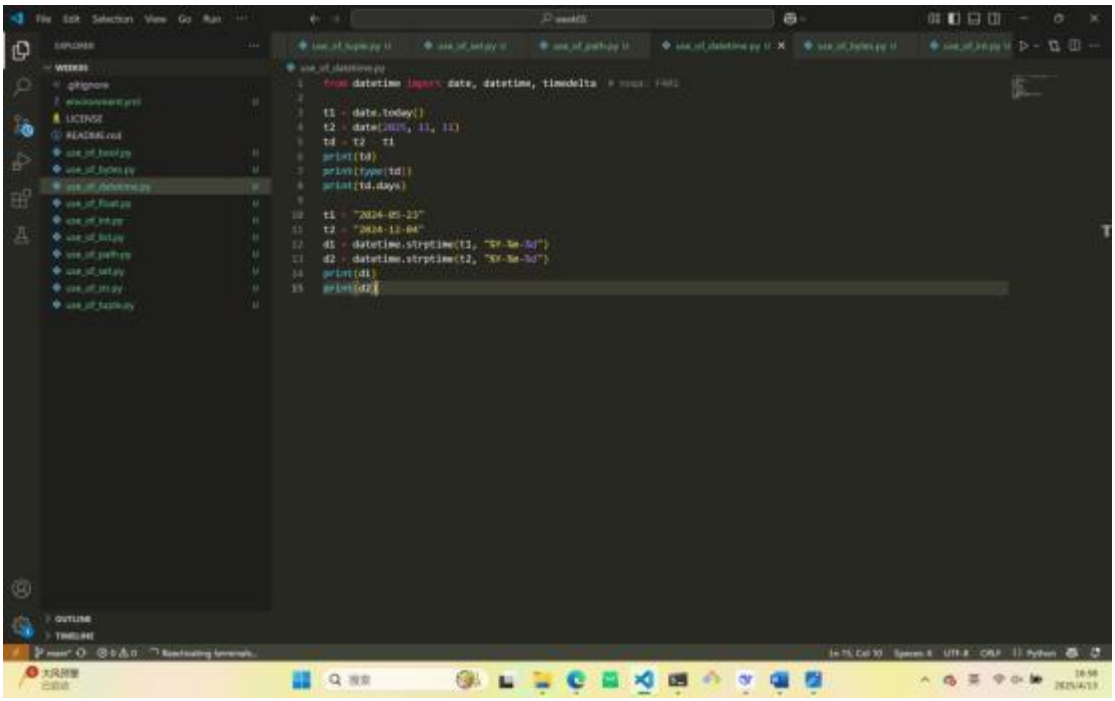
```
$ python use_of_set.py
{1, 4, 7}
<class 'set'>
unhashable type: 'list'
[1, 2, 1, 2, 5, 1]
{1, 2, 5}
{1, 2, 5}
True
False
(week05)
```

13.创建 use_of_path.py:



```
[EOF]
(Pdb) import wat
(Pdb) wat / p
------------------------------------------------------------------------
str: .
repr: WindowsPath('.')
type: pathlib.WindowsPath
parents: pathlib.Path, pathlib.PureWindowsPath, pathlib.PurePath

Public attributes:
  anchor: str = ''
  drive: str = ''
  name: str = ''
  parent: pathlib.WindowsPath = .
  parents: pathlib._PathParents = <WindowsPath.parents>
  parts: tuple = ()
  root: str = ''
  stem: str = ''
  suffix: str = ''
  suffixes: list = []

  def absolute() # Return an absolute version of this path by pr
epending the current…
  def as_posix() # Return the string representation of the path
with forward (/)…
  def as_uri() # Return the path as a 'file' URI.
  def chmod(mode, *, follow_symlinks=True) # Change the permissi
ons of the path, like os.chmod().
  def cwd() # Return a new path pointing to the current working
directory.
  def exists(*, follow_symlinks=True) # Whether this path exists
.…
  def expanduser() # Return a new path with expanded ~ and ~user
```

14.创建 use_of_datetime.py


from datetime import date, datetime, timedelta
t1 = date.today()
t2 = date(2025, 11, 11)
td = t2 - t1
print(td)
print(type(td))
print(td.days)
t1 = "2024-05-23"
t2 = "2024-12-04"
d1 = datetime.strptime(t1, "%Y-%m-%d")
d2 = datetime.strptime(t2, "%Y-%m-%d")
print(d1)
print(d2)