期末考试第二部分

一、find_name_value函数

1. 功能描述：
   find_name_value函数用于解析并分离数据文件名称中的变量名和对应的数值。用户调用find_name_value函数，输入代表文件名的字符串，函数将返回一个元组（name,value）

2. 设置测试用例：

1.1 **标准正数**

```
assert find_name_value('temorary0.1') == ('temporary', 0.1)
```

1.2 **标准负数**

```
assert find_name_value('melody0.5n') == ('melody', -0.5)
```

1.3 **无符号整数**

```
assert find_name_value('temp2010') == ('temp', 2010)
```

1.4 **带符号正数**

```
assert find_name_value('tp+0.2') == ('tp', 0.2)
```

1.5 **带符号负数**

```
assert find_name_value('tp-0.1') == ('tp', -0.1)
```

2.1 **纯变量名，无数字**

```
assert find_name_value('tanpeng') == ('tanpeng', None)
```

2.2 **小数点开头的数字**

```
assert find_name_value('rongrui.2010') == ('rongrui', 0.2010)
```

2.3 **数值为零**

```
assert find_name_value('life0') == ('life', 0.0)
```

3.1 **空字符串**

```
assert find_name_value('') == ('', None)
```

3.2 **文件名以数字开头**

```
assert find_name_value('123value') == ('123value', None)
```

3. 利用函数找到目标文件名的值

    1. 'phi0.1 xN14.2 kappa0.5n'

```
print(find_name_value('phi0.1 xN14.2 kappa0.5n'))
('phi', 0.1)
```

    2. 'a1_b14n_n0_c02'

```
('a', 1.0)
```

二、用Matlab作图

1. **Matlab代码**

```
% 环面参数
R = 3; % 大圆半径
r = 1; % 小圆半径

% 定义参数范围
theta = linspace(0, 2*pi, 100); % 小圆的角度范围
phi = linspace(0, 2*pi, 100);   % 大圆的角度范围

% 创建网格
[Theta, Phi] = meshgrid(theta, phi);

% 计算 x, y, z 坐标
X = (R + r * cos(Theta)) .* cos(Phi);
```

```
Y = (R + r * cos(Theta)) .* sin(Phi);
Z = r * sin(Theta);

% 绘制环面
figure;
surf(X, Y, Z);

% 图像美化
shading interp;       % 插值填充
colormap jet;         % 颜色映射
axis equal;           % 等比例坐标
title('环面 (Torus) 的三维图像');
xlabel('X');
ylabel('Y');
zlabel('Z');
```

! 结果图(https://users/desktop/结果图.fig)

三、用Mathematica求值

1. **求无穷级数的和** [\sum_{n=1}^\infty \frac{1}{n^3 + n^2}]

```
Sum[1/(n^3 + n^2), n, 1, Infinity{}]
```

结果为： [\frac{\pi^2}{6} - 1 \approx 0.644934]

2. **求定积分的值** [\int_{0}^{\infty} \frac{\sqrt{x} \ln x}{(x + 1)^2} , dx]

```
Integrate[Sqrt[x] * Log[x] / (x+1)^2, {x, 0, Infinity}]
```

结果为： [-\frac{\pi}{4} \approx -0.785398]

四、用markdown写出文本内容

Q: Find the solution of the following equation with respect to (\theta):

A: [A \cos \theta + B \sin \theta + C = 0]

let (x_1 = \cos \theta) and (x_2 = \sin \theta), then the solution is given by the intersection of the circle and the line:

[x_1^2 + x_2^2 = 1]

[A x_1 + B x_2 + C = 0]

We reformulate the equations in a parametric form:

[|x|^2 = 1]

$$ x(t) = a + t b $$

where $x = (x_1, x_2)$, $a = (0, -C / B)$, $b = (-C / A, C / B)$, and t is a parameter. The intersection points satisfy the following equation:

$$ |a + t b|^2 = 1 $$ which can be solved for t to find the intersection points:

$$ t_{1,2} = \frac{-a \cdot b \pm \sqrt{(a \cdot b)^2 - |b|^2 (|a|^2 - 1)}}{|b|^2} $$