

例 3.1 拉格朗日乘子法

修改参数：需设置变量

f: 目标函数

g: 约束条件

"""

```
from sympy import *
```

```
def Lagrange():
```

```
    # 设置变量
```

```
    r = symbols("r")
```

```
    h = symbols("h")
```

```
    l = symbols("lamda")
```

```
    # 构造拉格朗日等式
```

```
    L = f - l * g
```

```
    # 求导，构造 KKT 条件
```

```
    difyL_r = diff(L, r) # 对变量 r 求导
```

```
    difyL_h = diff(L, h) # 对变量 h 求导
```

```
    difyL_l = diff(L, l) # 对 l 求导
```

```
    # 求解 KKT 等式
```

```
    aa = solve([difyL_r, difyL_h, difyL_l], [r, h, l])
```

```
    aa = aa[0]
```

```
    r = aa[0]
```

```
    h = aa[1]
```

```
    print("r 的取值为:", r)
```

```
    print("h 的取值为:", h)
```

```
    print("最优解为: ", 2 * pi * r * h + 2 * pi * r ** 2)
```

```
if __name__ == '__main__':
```

```
    r = symbols("r")
```

```
    h = symbols("h")
```

```
    l = symbols("lamda")
```

```
    f = 2 * pi * r * h + 2 * pi * r ** 2
```

```
    g = r ** 2 * h - 4 / 3
```

```
    Lagrange()
```