moneyness == 0 二阶导数不连续

left parabolic --- dc<x<=0

```
In[1]:= w[x_] = vc + sc * x + pc * x^2
Out[1]= vc + sc x + pc x^2

In[2]:= w'[x]
Out[2]= sc + 2 pc x

In[3]:= w''[x]
Out[3]= 2 pc
```

right parabolic --- 0<x<=uc

```
In[4]:= w[x_] = vc + sc * x + cc * x^2
Out[4]= vc + sc x + cc x^2

In[5]:= w'[x]
Out[5]= sc + 2 cc x

In[6]:= w''[x]
Out[6]= 2 cc
```

moneyness == dc 二阶导数不连续

```
In[1]:= w[x_] = vc + sc * x + pc * x^2
Out[1]= vc + sc x + pc x^2

In[2]:= w[dc]
Out[2]= dc^2 pc + dc sc + vc

In[3]:= w'[x]
Out[3]= sc + 2 pc x

In[4]:= w'[dc]
Out[4]= 2 dc pc + sc

In[5]:= w''[x]
Out[5]= 2 pc
```

In[6]:=
$$w[x\_] = vc - \left(1 + \frac{1}{dsm}\right) * pc * dc^2 - \frac{sc * dc}{2 * dsm} + \left(1 + \frac{1}{dsm}\right) * (2 * pc * dc + sc) * x - \left(\frac{pc}{dsm} + \frac{sc}{2 * dc * dsm}\right) * x^2$$

Out[6]=
$$-dc^2 \left(1 + \frac{1}{dsm}\right) pc - \frac{dc\ sc}{2\ dsm} + vc + \left(1 + \frac{1}{dsm}\right) (2\ dc\ pc + sc)\ x - \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right) x^2$$

In[7]:=
```
w[dc]
```

Out[7]=
$$-dc^2 \left(1 + \frac{1}{dsm}\right) pc - \frac{dc\ sc}{2\ dsm} + dc \left(1 + \frac{1}{dsm}\right) (2\ dc\ pc + sc) - dc^2 \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right) + vc$$

In[8]:=
```
Simplify[
化简
```
$$-dc^2 \left(1 + \frac{1}{dsm}\right) pc - \frac{dc\ sc}{2\ dsm} + dc \left(1 + \frac{1}{dsm}\right) (2\ dc\ pc + sc) - dc^2 \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right) + vc]$$

Out[8]=
$$dc^2\ pc + dc\ sc + vc$$

In[9]:=
```
w'[x]
```

Out[9]=
$$\left(1 + \frac{1}{dsm}\right) (2\ dc\ pc + sc) - 2 \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right) x$$

In[10]:=
```
w'[dc]
```

Out[10]=
$$\left(1 + \frac{1}{dsm}\right) (2\ dc\ pc + sc) - 2\ dc \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right)$$

In[11]:=
```
Simplify[(1 + 1/dsm) (2 dc pc + sc) - 2 dc (pc/dsm + sc/(2 dc dsm))]
化简
```

Out[11]=
$$2\ dc\ pc + sc$$

In[35]:=

In[12]:=
```
w''[x]
```

Out[12]=
$$-2 \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right)$$

In[13]:=
```
w''[dc]
```

Out[13]=
$$-2 \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right)$$

In[14]:=
```
Simplify[-2 (pc/dsm + sc/(2 dc dsm))]
化简
```

Out[14]=
$$-\frac{2\ dc\ pc + sc}{dc\ dsm}$$

In[15]:=
$$sc + 2\ pc\ x == \left(1 + \frac{1}{dsm}\right) (2\ dc\ pc + sc) - 2 \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right) x$$

Out[15]=
$$sc + 2\ pc\ x == \left(1 + \frac{1}{dsm}\right) (2\ dc\ pc + sc) - 2 \left(\frac{pc}{dsm} + \frac{sc}{2\ dc\ dsm}\right) x$$

In[16]:= Solve[sc + 2 pc x == (1 + 1/dsm) (2 dc pc + sc) - 2 (pc/dsm + sc/(2 dc dsm)) x, {x}]
解方程

Out[16]= {{x → dc}}

In[17]:= -2 (pc/dsm + sc/(2 dc dsm)) == 2 pc

Out[17]= -2 (pc/dsm + sc/(2 dc dsm)) == 2 pc

In[18]:= Solve[-2 (pc/dsm + sc/(2 dc dsm)) == 2 pc, {dc, dsm, pc, sc}]
解方程

Out[18]= {{sc → -2 (dc pc + dc dsm pc)}}

In[19]:= FindInstance[-2 (pc/dsm + sc/(2 dc dsm)) == 2 pc, {dc, dsm, pc, sc}]
求解

Out[19]= {{dc → -6, dsm → -6, pc → 1/15, sc → -4}}

moneyness == dc(1+dsm)

In[1]:=
```
w[x_] = vc - (1 + 1/dsm) * pc * dc^2 - sc * dc/(2 * dsm) +
  (1 + 1/dsm) * (2 * pc * dc + sc) * x - (pc/dsm + sc/(2 * dc * dsm)) * x^2
```

Out[1]= -dc^2 (1 + 1/dsm) pc - dc sc/(2 dsm) + vc + (1 + 1/dsm) (2 dc pc + sc) x - (pc/dsm + sc/(2 dc dsm)) x^2

In[2]:= w[dc (1 + dsm)]

Out[2]= -dc^2 (1 + 1/dsm) pc - dc sc/(2 dsm) + dc (1 + 1/dsm) (1 + dsm) (2 dc pc + sc) - dc^2 (1 + dsm)^2 (pc/dsm + sc/(2 dc dsm)) + vc

In[3]:= Simplify[-dc^2 (1 + 1/dsm) pc - dc sc/(2 dsm) + dc (1 + 1/dsm) (1 + dsm) (2 dc pc + sc) - dc^2 (1 + dsm)^2 (pc/dsm + sc/(2 dc dsm)) + vc]
化简

Out[3]= dc^2 (1 + dsm) pc + 1/2 dc (2 + dsm) sc + vc

In[4]:= w'[x]

Out[4]= (1 + 1/dsm) (2 dc pc + sc) - 2 (pc/dsm + sc/(2 dc dsm)) x

In[5]:= Simplify[$\left(1+\frac{1}{dsm}\right)\ (2\ dc\ pc+sc)-2\left(\frac{pc}{dsm}+\frac{sc}{2\ dc\ dsm}\right)\ x$]
化简

Out[5]= $\frac{(2\ dc\ pc+sc)\ (dc+dc\ dsm-x)}{dc\ dsm}$

In[6]:= w'[dc (1 + dsm)]

Out[6]= $\left(1+\frac{1}{dsm}\right)\ (2\ dc\ pc+sc)-2\ dc\ (1+dsm)\ \left(\frac{pc}{dsm}+\frac{sc}{2\ dc\ dsm}\right)$

In[7]:= Simplify[$\left(1+\frac{1}{dsm}\right)\ (2\ dc\ pc+sc)-2\ dc\ (1+dsm)\ \left(\frac{pc}{dsm}+\frac{sc}{2\ dc\ dsm}\right)$]
化简

Out[7]= 0

In[8]:= w''[x]

Out[8]= $-2\left(\frac{pc}{dsm}+\frac{sc}{2\ dc\ dsm}\right)$

In[9]:= w''[dc (1 + dsm)]

Out[9]= $-2\left(\frac{pc}{dsm}+\frac{sc}{2\ dc\ dsm}\right)$

In[10]:= Simplify[$-2\left(\frac{pc}{dsm}+\frac{sc}{2\ dc\ dsm}\right)$]
化简

Out[10]= $-\frac{2\ dc\ pc+sc}{dc\ dsm}$

In[11]:= w[x_] = vc + dc * (2 + dsm) * (sc / 2) + (1 + dsm) * pc * dc ^ 2

Out[11]= $dc^2\ (1+dsm)\ pc+\frac{1}{2}\ dc\ (2+dsm)\ sc+vc$

In[12]:= w'[x]

Out[12]= 0

In[13]:= w''[x]

Out[13]= 0