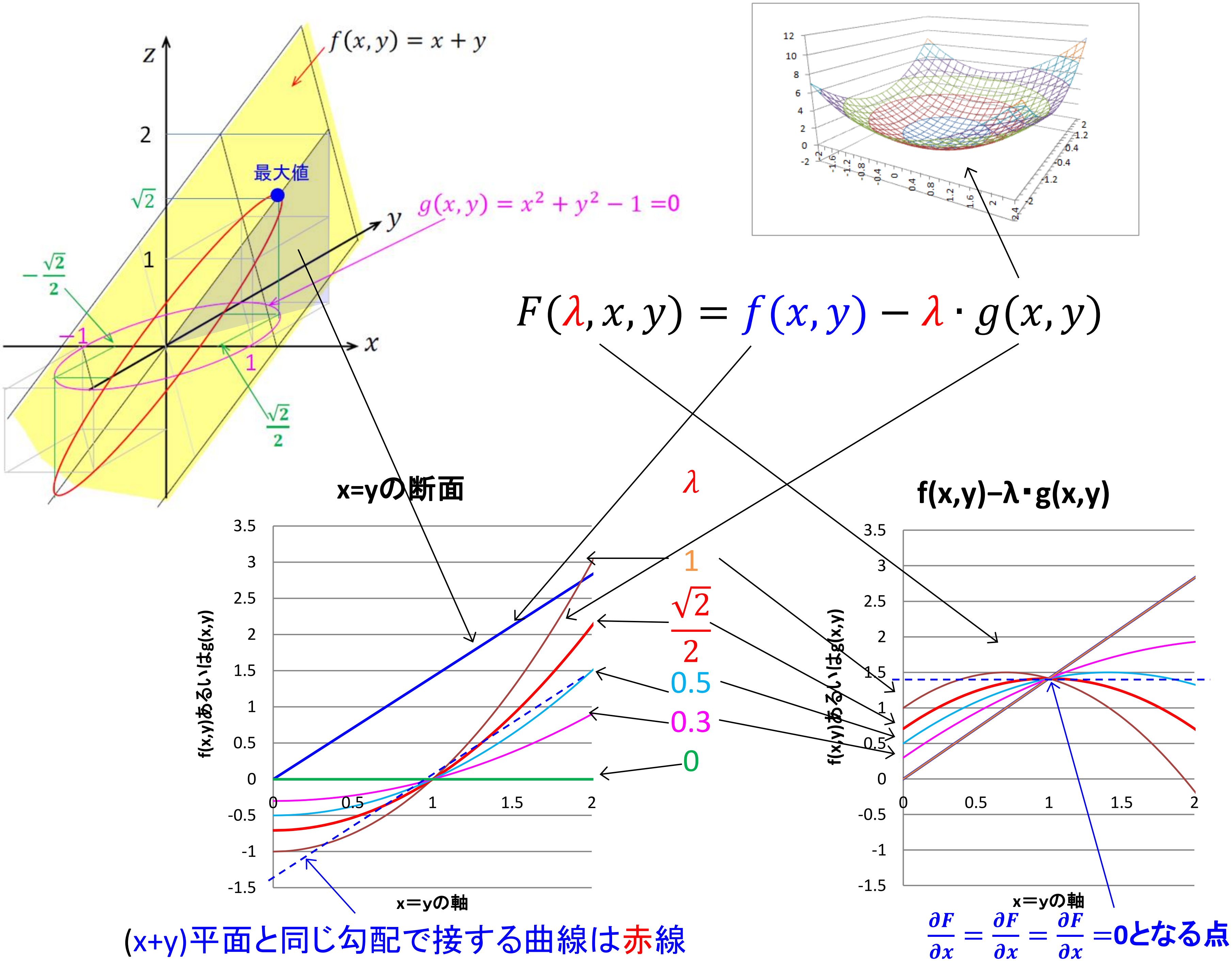
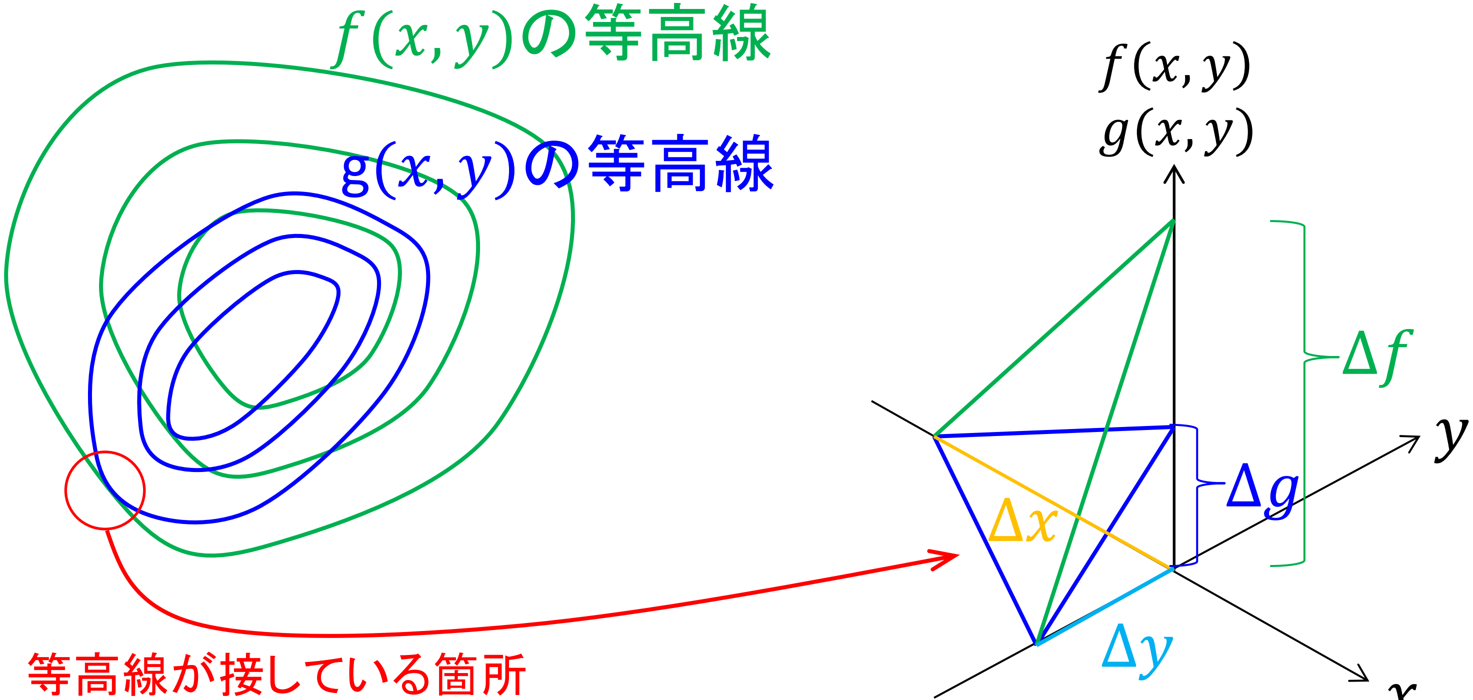


$f(x,y) = x + y$
z
2
最大値
$\sqrt{2}$
$g(x,y) = x^2 + y^2 - 1 = 0$
y
1
$-\frac{\sqrt{2}}{2}$
−1
x
1
$\frac{\sqrt{2}}{2}$
$F(\lambda, x, y) = f(x,y) - \lambda \cdot g(x,y)$
x=yの断面
λ
f(x,y)−λ･g(x,y)
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
0.5
1
1.5
2
f(x,y)あるいはg(x,y)
1
$\frac{\sqrt{2}}{2}$
0.5
0.3
0
x=yの軸
(x+y)平面と同じ勾配で接する曲線は赤線
$\frac{\partial F}{\partial x} = \frac{\partial F}{\partial x} = \frac{\partial F}{\partial x}$ =0となる点
12
10
8
6
4
2
0
-2



$$\frac{\Delta f}{\Delta g} = \lambda$$

$\frac{\Delta f}{\Delta g} = \lambda$とおくと

$$\frac{\Delta f/\Delta x}{\Delta g/\Delta x} = \frac{\Delta f/\Delta y}{\Delta g/\Delta y} = \lambda$$

$\frac{\Delta f}{\Delta g} = \lambda$を書き換えると

$$\Delta f - \lambda \cdot \Delta g = 0$$

$$F(\lambda, x, y) = f(x, y) - \lambda \cdot g(x, y)$$

$$\frac{\Delta F}{\Delta x} = \frac{\Delta f}{\Delta x} - \lambda \cdot \frac{\Delta g}{\Delta x} = \frac{\Delta f - \lambda \cdot \Delta g}{\Delta x} = 0$$

同様に

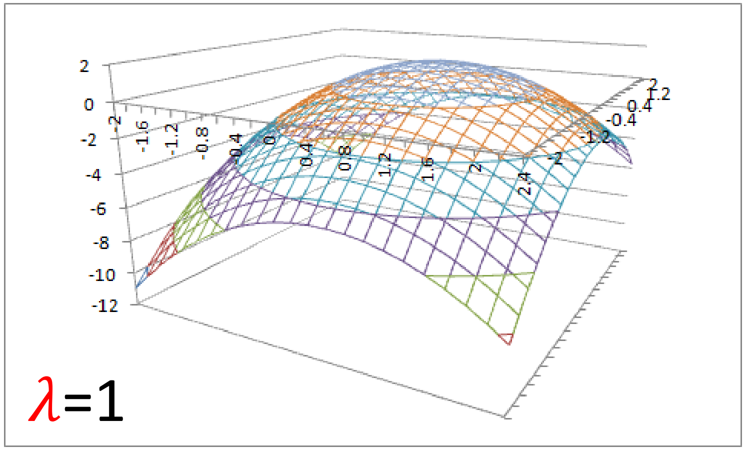
$$\frac{\Delta F}{\Delta y} = \frac{\Delta f}{\Delta y} - \lambda \cdot \frac{\Delta g}{\Delta y} = \frac{\Delta f - \lambda \cdot \Delta g}{\Delta y} = 0$$

$$\frac{\Delta F}{\Delta \lambda} = -g(x, y) = 0$$

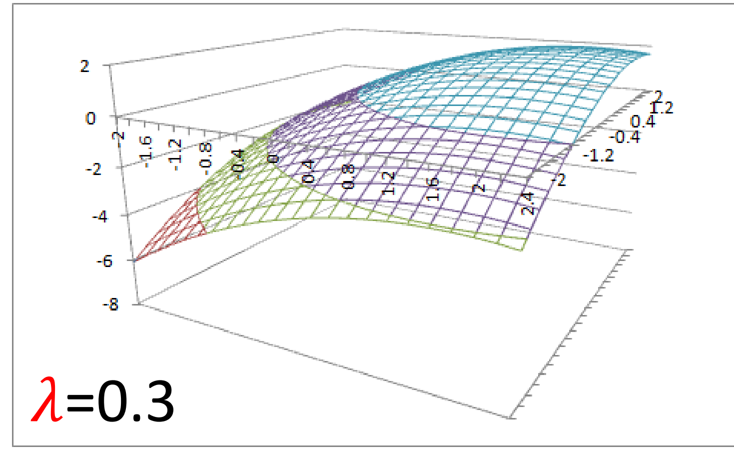
←制約条件

以上より

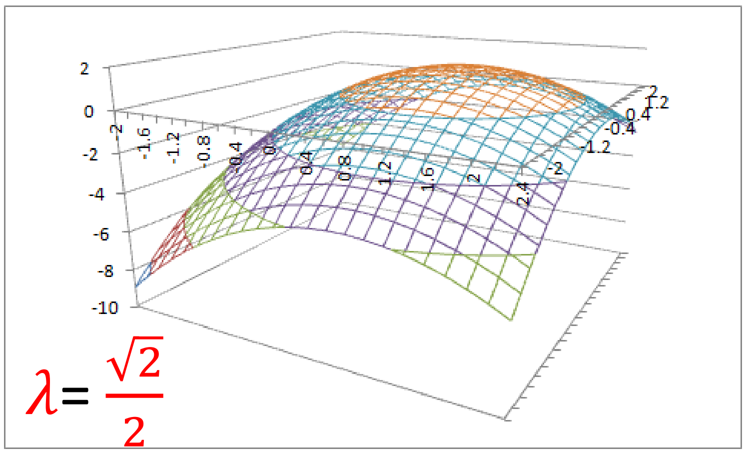
$$\frac{\partial F}{\partial \lambda} = \frac{\partial F}{\partial x} = \frac{\partial F}{\partial y} = 0$$



λ=1



λ=0.3



$\lambda= \frac{\sqrt{2}}{2}$

λ

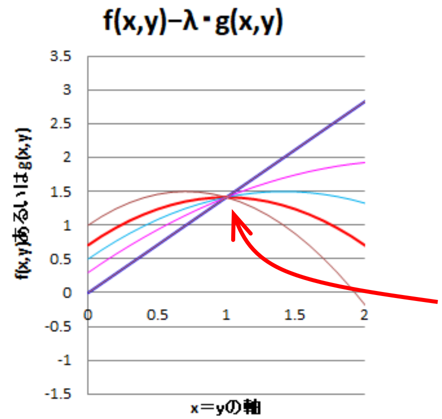
1

$\frac{\sqrt{2}}{2}$

0.5

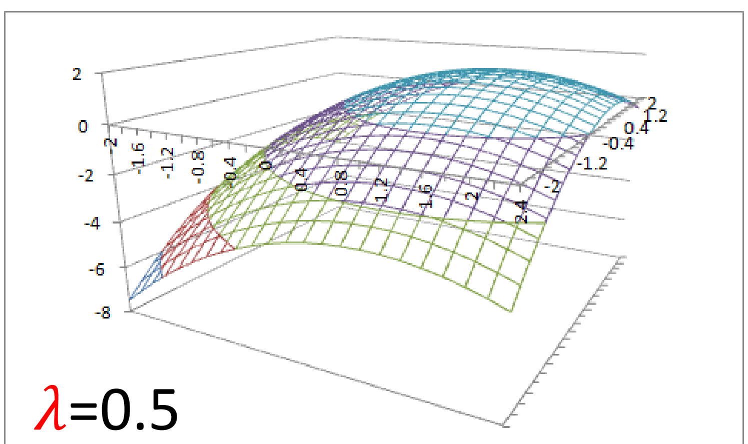
0.3

0

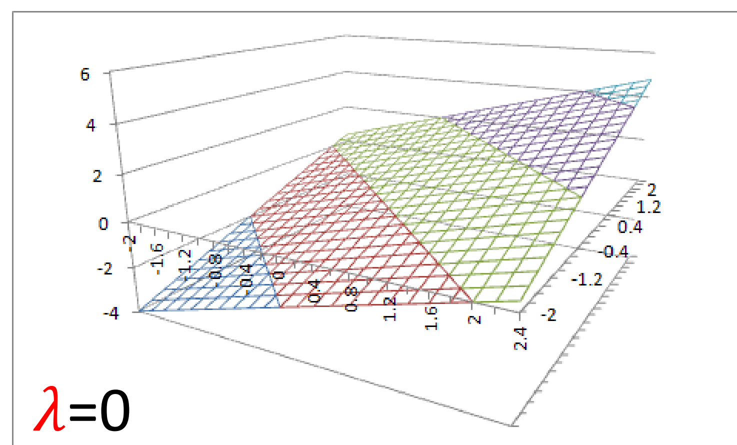


$\frac{\partial F}{\partial \lambda} = 0$とは

λを変えても
Fの高さが不変のこと



λ=0.5



λ=0