dz4-4

September 23, 2024

[1]:
```
import sympy
#        -1/2!!!!!!
coefs = {
             'x^2': 2,
             'x': 20,
             'xy': 6,
             'y': 32,
             'y^2': 5,
         }
C = sympy.Matrix([[coefs['x^2'], int(coefs['xy']/2)], [int(coefs['xy']/2),␣
 ↪coefs['y^2']]])
C1 = C**(-1)
VarX = C1[0, 0]
sigmaX = sympy.sqrt(VarX)
VarY = C1[1, 1]
sigmaY = sympy.sqrt(VarY)
CovXY = C1[0, 1]
roXY = CovXY/(sigmaX*sigmaY)
EX, EY = sympy.symbols('EX, EY')
equations = (
             sympy.Eq(int(coefs['x^2'])*EX + int(coefs['xy']/2)*EY,␣
 ↪int(coefs['x']*(-1/2))),
             sympy.Eq(int(coefs['xy']/2)*EX + int(coefs['y^2'])*EY,␣
 ↪int(coefs['y']*(-1/2)))
         )
sol = sympy.solve(equations, (EX, EY))

x,y = sympy.symbols('x y',real=True)

EX_Y=sol[EX]+roXY*sigmaX/sigmaY*(y-sol[EY])
EY_X=sol[EY]+roXY*sigmaY/sigmaX*(x-sol[EX])

VarX_Y=sigmaX**2*(1-roXY**2)
VarY_X=sigmaY**2*(1-roXY**2)
```

```
print(f'EX_Y = {EX_Y},\nEY_X = {EY_X},\nVarX_Y = {VarX_Y},\nVarY_X =␣
  ↪{VarY_X},\nEX = {sol[EX]},\nEY = {sol[EY]},\nVarX = {VarX},\nVarY =␣
  ↪{VarY},\nCovXY = {CovXY},\nroXY = {roXY}')
```

```
EX_Y = -3*y/2 - 5,
EY_X = -3*x/5 - 16/5,
VarX_Y = 1/2,
VarY_X = 1/5,
EX = -2,
EY = -2,
VarX = 5,
VarY = 2,
CovXY = -3,
roXY = -3*sqrt(10)/10
```