Assuming Raoult's law to be valid, prepare a *Pxy* diagram for a temperature of 75 °C for one of the following systems:

(a) Acetonitrile (1)/Nitromethane (2).

```python
import numpy as np
import matplotlib.pyplot as plt
Xl = np.linspace(0,1,100)
X2 = 1-Xl
```

```python
# Defining antoine constants
ANT_Acetonitrile = [14.8950,3413.10,-22.627]
ANT_Nitromethane = [14.7513,3331.70,-45.550]
```

```python
def Psat1(T):
    return np.exp(ANT_Acetonitrile[0]-ANT_Acetonitrile[1]/(T+ANT_Acetonitrile[2]))
Psat1(348.15)
```

Out[ ]: 82.27165091238044

```python
def Psat2(T):
    return np.exp(ANT_Nitromethane[0]-ANT_Nitromethane[1]/(T+ANT_Nitromethane[2]))
Psat2(348.15)
```

Out[ ]: 42.14244606060848

```python
Total_Pressure = Xl*Psat1(348.15) + X2*Psat2(348.15)
y1 = Xl*Psat1(348.15)/Total_Pressure
```

```python
# For Dew Points
Total_Pressure_Dew = 1/(Xl/Psat1(348.15)+X2/Psat2(348.15))
```

```python
x1 = Xl*Total_Pressure_Dew/Psat1(348.15)
```

```python
plt.plot(Xl,Total_Pressure)
plt.plot(Xl,Total_Pressure_Dew)
plt.xlabel('x1,y1',fontsize = 15)
plt.ylabel('P/kPa',fontsize = 15)
plt.title('Manual Calculation Plot P vs xy')
```

```
# plt.legend()
plt.grid()
plt.show()
```


Manual Calculation Plot P vs xy
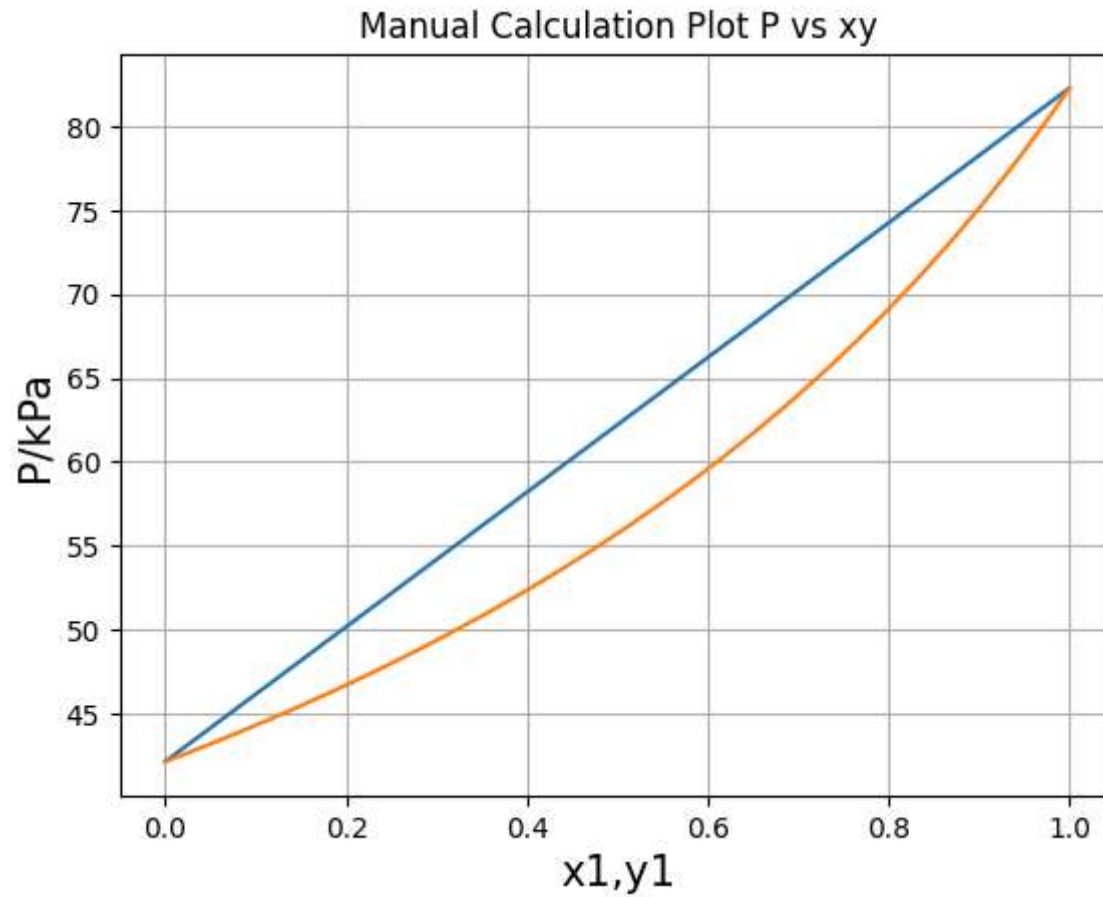
```
In [ ]: import matplotlib.pyplot as plt
        import pandas as pd

        # Load data
        data = pd.read_csv('34 VLE Dwsim Data.csv', header = None)

        # Calling DWSIM dataset
        data.head()
```
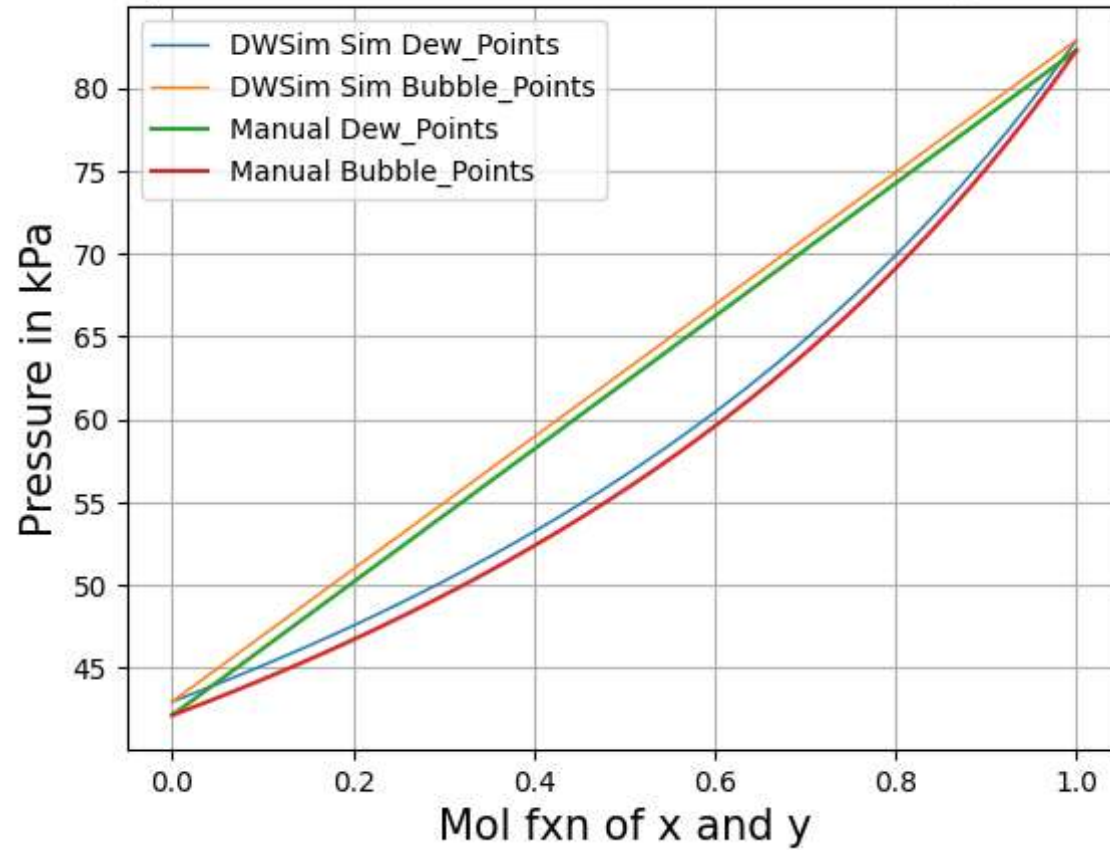
	0	1	2	3
0	0.000	42.9665	0.000	42.9665
1	0.025	43.9642	0.025	43.4900
2	0.050	44.9620	0.050	44.0265
3	0.075	45.9597	0.075	44.5764
4	0.100	46.9575	0.100	45.1402

In [ ]:
```python
# Defining headers as variables
X_Acetonitrile = data[0]
Bubble_Points = data[1]
Y_Acetonitrile = data[2]
Dew_Points = data[3]
```

In [ ]:
```python
# Making plots
plt.plot(X_Acetonitrile, Dew_Points,lw = 1,label = "DWSim Sim Dew_Points")
plt.plot(Y_Acetonitrile, Bubble_Points,lw = 1,label = "DWSim Sim Bubble_Points")
plt.plot(Xl,Total_Pressure,label = "Manual Dew_Points")
plt.plot(Xl,Total_Pressure_Dew,label = "Manual Bubble_Points")
plt.xlabel("Mol fxn of x and y", fontsize = 15)
plt.ylabel("Pressure in kPa",fontsize = 15)
plt.title('Comparision of Manual Calculation and DWSim data (Plot P vs xy)')
plt.grid()
plt.legend()
plt.show()
```

Comparision of Manual Calculation and DWSim data (Plot P vs xy)

In [ ]: