Possibility statistics assignment

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PartI

We have several features X, Y and Z that help us describe 3 people A, B, C the following way,What is the correlation matrix of X, Y and Z?:

	X	**Y**	**Z**
A	1	2	1
B	2	-1	1
C	3	3	1

Solution:

$$
\begin{aligned}
E(X) &= (1+2+3)/3 = 2 \\
E(Y) &= (2-1+3)/3 = \frac{4}{3} \\
E(Z) &= (1+1+1)/3 = 1 \\
E(XY) &= (1\times 2 + 2\times -1 + 3\times 3)/3 = 3 \\
E(XZ) &= (1\times 1 + 2\times 1 + 3\times 1)/3 = 2 \\
E(YZ) &= (2\times 1 + -1\times 1 + 3\times 1)/3 = \frac{4}{3} \\
Var(X) &= \frac{1^2+2^2+3^2-3\times 2^2}{3} = \frac{2}{3} \\
Var(Y) &= \frac{2^2+(-1)^2+3^2-3\times (4/3)^2}{3} = \frac{26}{9} \\
Var(Z) &= 0
\end{aligned}
$$

$$Cov(X,Y) = 3 - 2 \times \frac{4}{3} = \frac{1}{3}$$
$$Cov(X,Z) = 2 - 2 \times 1 = 0$$
$$Cov(Y,Z) = \frac{4}{3} - \frac{4}{3} \times 1 = 0$$

According to the results, the correlation matrix is:

$$\begin{bmatrix} 2/3 & 1/3 & 0 \\ 1/3 & 26/9 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Check in Python:

```
import numpy as np
data = np.array([[1, 2, 3],
                 [2, -1, 3],
                 [1, 1, 1]])
np.cov(data,bias = True)
```