

Working Through “Causal Inference in Statistics: A Primer”

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```
1 import numpy as np
2 import networkx as nx
3 import matplotlib.pyplot as plt
```

Chapter 1

Sections 1.1 through 1.4 omitted

1.5

1.5.1 (Paraphrased)

SCM 1.5.1

Consider the following causal model:

$$V = \{X, Y, Z\}; \quad U = \{U_X, U_Y, U_Z\}; \quad F = \{f_x, f_y, f_z\}$$

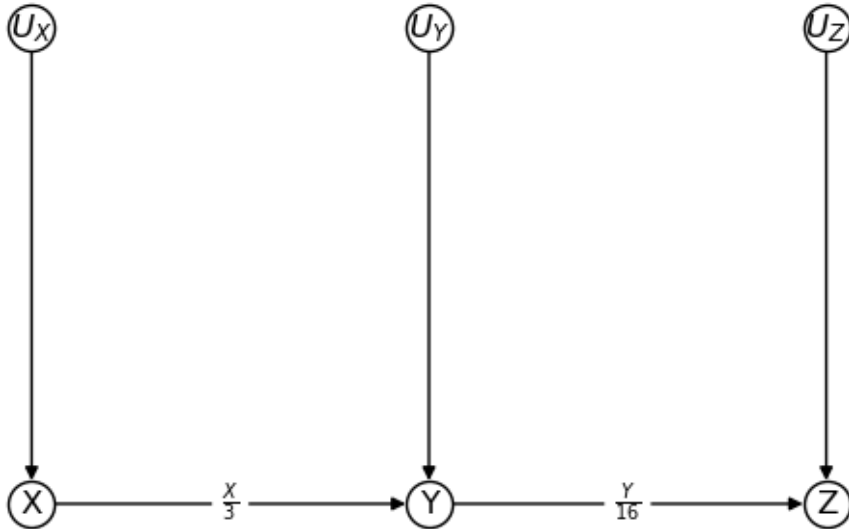
$$f_X : X = U_X \quad f_Y : Y = \frac{X}{3} + U_Y \quad f_Z : Z = \frac{Y}{16} + U_Z$$

Assume exogenous variables in U are independent with expectation 0.

a) Draw the graph that complies with SCM 1.5.1.

Code presented below the graph.

Question 1.5.1-A: Causal Graph



```
1 edges = [['X', 'Y'], ['Y', 'Z'],
2           ['$U_X$', 'X'], ['$U_Y$', 'Y'], ['$U_Z$', 'Z']]
3
4 G = nx.DiGraph()
5 G.add_edges_from(edges)
6
7 pos = {
8     'X':[1, 0],
9     'Y':[1.25, 0],
10    'Z':[1.5, 0],
11    '$U_X$':[1, 0.3],
12    '$U_Y$':[1.25, 0.3],
13    '$U_Z$':[1.5, 0.3],
14 }
15
16 plt.figure()
17
18 nx.draw(G, pos2, with_labels=True, node_color='white'
19         , edge_color='black', edgecolors='black')
20
```

```
21 nx.draw_networkx_edge_labels(  
22     G, pos,  
23     edge_labels={('X', 'Y'): '$\\frac{X}{3}$',  
24                 ('Y', 'Z'): '$\\frac{Y}{16}$'},  
25     font_color='black'  
26 )  
27 plt.title("Question 1.5.1-A: Causal Graph")  
28  
29  
30 plt.rcParams["figure.figsize"] = (5, 3)  
31  
32 plt.axis('off')  
33 plt.show()
```