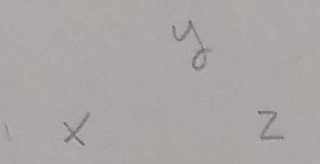
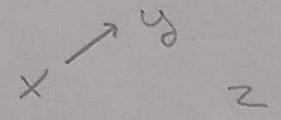
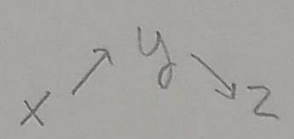
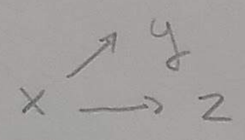
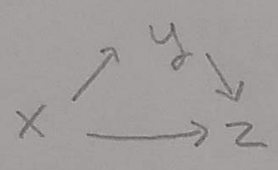
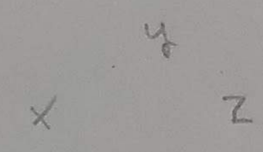
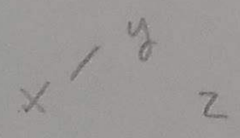
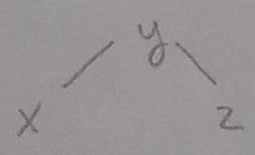
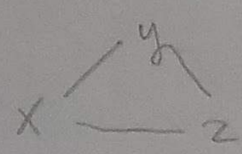
1.5

a. Consider soln to 1.1b: 3 binary r.v. s.t. $X \oplus Y \oplus Z = 0$ (XOR)

$$\mathcal{I}(p) = \{ X \perp\!\!\!\perp Y,\ X \perp\!\!\!\perp Z,\ Y \perp\!\!\!\perp Z \}$$

Importantly, $X \perp\!\!\!\perp Y \mid Z$, $X \perp\!\!\!\perp Z \mid Y$, $Y \perp\!\!\!\perp Z \mid X \notin \mathcal{I}(p)$

| Directed Graphs | Violation |
|---|---|
|  | $X \perp\!\!\!\perp Y \mid Z$ |
|  | $X \not\perp\!\!\!\perp Y$ |
|  | $X \not\perp\!\!\!\perp Y$ |
|  | $Y \not\perp\!\!\!\perp Z$ |
|  | $X \not\perp\!\!\!\perp Y$ |
| Undirected  | $X \perp\!\!\!\perp Y \mid Z$ |
|  | $X \perp\!\!\!\perp Y$ |
|  | $X \perp\!\!\!\perp Y$ |
|  | $X \perp\!\!\!\perp Y$ |

No directed or undirected graph has $\mathcal{I}(6) = \mathcal{I}(p)$