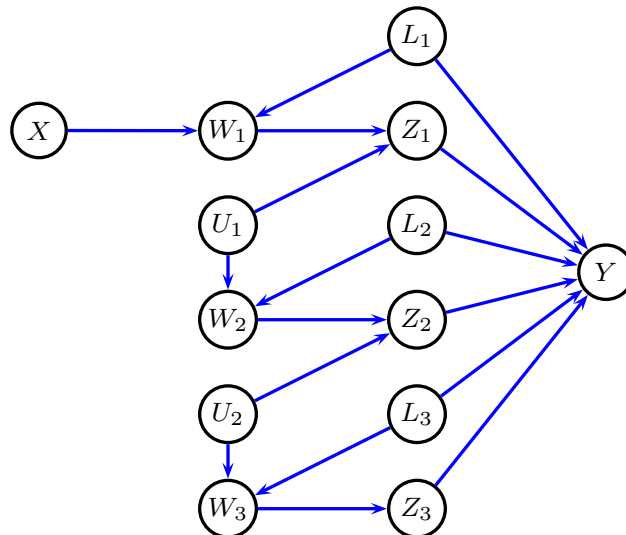COMH7266: Longitudinal Analysis and Causal Inference

Final Assignment: Due 11 Aug 2017

1. Conduct an analysis assessing the effect of smoking cessation (qsmk) $A$ on death $Y$ in the NHEFS study by fitting a marginal structural model (MSM) via inverse probability weighting. Formally (mathematically) define the MSM, describe how the model was fit, and justify any analytical choices or decisions you made. Interpret the results.

2. Consider the DAG



Is $X$ d-separated from $Y$ given $\{L_1, Z_1, L_2, Z_2, Z_3\}$? Provide a justification for your answer.

3. Assuming conditional exchangeability and ignoring sampling variability, compute the causal risk ratio using standardization for the data given in the table below.

| | $L$ | $A$ | $Y$ |
|---|---|---|---|
| Cybele | 0 | 0 | 0 |
| Saturn | 0 | 0 | 1 |
| Ceres | 0 | 0 | 0 |
| Pluto | 0 | 0 | 0 |
| Vesta | 0 | 1 | 0 |
| Neptune | 0 | 1 | 0 |
| Juno | 0 | 1 | 1 |
| Jupiter | 0 | 1 | 1 |
| Diana | 1 | 0 | 0 |
| Phoebus | 1 | 0 | 1 |
| Latona | 1 | 0 | 0 |
| Mars | 1 | 1 | 1 |
| Minerva | 1 | 1 | 1 |
| Vulcan | 1 | 1 | 1 |
| Venus | 1 | 1 | 1 |
| Seneca | 1 | 1 | 1 |
| Proserpina | 1 | 1 | 1 |
| Mercury | 1 | 1 | 0 |
| Juventas | 1 | 1 | 0 |
| Bacchus | 1 | 1 | 0 |