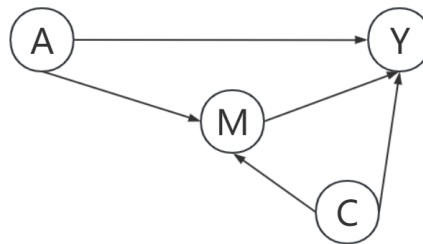


## HW3

1. Assume that there is a randomized experiment, where participants were assigned to the different treatment groups. The DAG underlying this study is provided below (A: treatment; M: mediator; Y: outcome; C: confounders).
  - (a) What do you notice about the DAG structure and why does this make sense?
  - (b) What assumptions are we making when estimating direct and indirect effects?
  - (c) Based on assumptions in (b), do you agree with this DAG? What should be updated?



2. There are four core assumptions for an IV analysis: (1) Relevance; (2) Exclusion restriction; (3) Randomized assignment; (4) Monotonicity. Please explain why the first three assumptions (instrumental conditions) are needed for IV estimation using d-separation ideas.