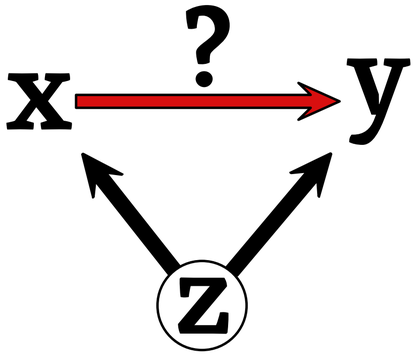
Simulating a shared cause

- Every DAG implies a causal relation between variables.
- We can use distributions to simulate the generative model implied by this DAG:

$$y \sim Normal(\alpha_y + \beta_{yx}x + \beta_{yz}z, \sigma_y)$$
$$x \sim Normal(\alpha_x + \beta_{xz}z, \sigma_x)$$
$$z \sim Bernoulli(p_z)$$



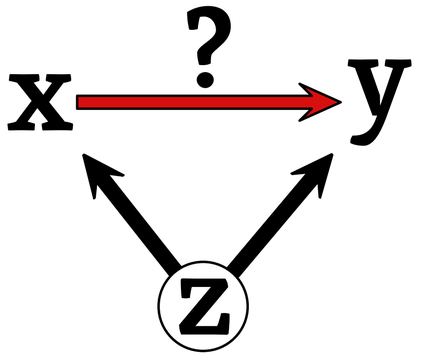
Simulating a shared cause

Math

$$y \sim Normal(\mu = 1 + 0.5x + 2z, \sigma = 1)$$

$$x \sim Normal(\mu = 1 + z, \sigma = 1)$$

$$z \sim Bernoulli(p = 0.5)$$



R Code

```
N = 200
z = rbinom(N, 1, 0.5)           # z ~ bernoulli(0.5)
x = rnorm(N, 1 + z)             # x ~ normal(1 + z, 1)
y = rnorm(N, 1 + 0.5*x + 2*z) # y ~ normal(1 + 0.5x + 2z, 1)
```