Dependence - exercises

Exercise 1: Causal and statistical dependency.

For each of the following programs:

- Draw the dependency diagram (Bayes net). If you don't have software on your computer for doing this, Google Docs has a decent interface for creating drawings.
- Use informal evaluation order reasoning and the intervention method to determine causal dependency between A and B.
- Use conditioning to determine whether A and B are statistically dependent.

a)

```
var a = flip()

var b = flip()

var c = flip(a && b ? .8 : .5)
```

run ▼

b)

```
var a = flip()

var b = flip(a ? .9 : .2)

var c = flip(b ? .7 : .1)
```

run ▼

c)

```
var a = flip()

var b = flip(a ? .9 : .2)
```

```
var c = flip(a ? .7 : .1)
```

run ▼

d)

```
var a = flip(.6)

var c = flip(.1)

var z = flip() ? a : c;

var b = z ? 'foo' : 'bar'
```

run ▼

e)

```
x

var examFairPrior = Bernoulli({p: .8})

var doesHomeworkPrior = Bernoulli({p: .8})

var examFair = mem(function(exam) {return sample(examFairPrior)})

var doesHomework = mem(function(student) {return sample(doesHomeworkPrior)});



var pass = function(student, exam) {

  return flip(examFair(exam) ?

              (doesHomework(student) ? .9 : .5) :

              (doesHomework(student) ? .2 : .1));

}

var a = pass('alice', 'historyExam');

var b = pass('bob', 'historyExam');
```

run ▼