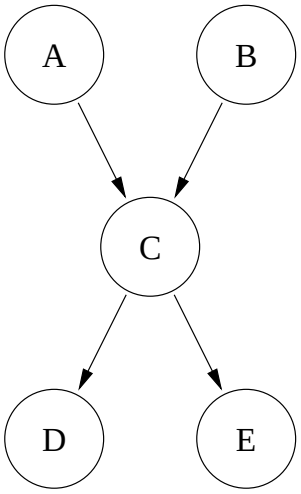
STA 247 — Practice problem set #2 (non-credit, not for handing in)

Question 1: The random variable X has the binomial distribution with parameters $n = 60$ and $p = 1/40$. The random variable Y has the binomial distribution with $n = 48$ and $p = 1/30$. Prove that $P(X + Y \geq 31)$ is no more than $1/10$.

Question 2: You have been informed that the main U of T web page is accessed an average of 25000 times per day. You have also been told that this web page is accessed more than 50000 times on 1% of the days. Say whatever you can about the standard deviation of the number of accesses in a day.

Question 3: Suppose we roll 10 fair six-sided dice. Let S be the sum of the numbers showing on all of these dice. Find the mean and standard deviation of S, and the mean and standard deviation of $S/10$, which is the average value shown on the 10 dice.

Question 4: Suppose that the joint distribution of the random variables A, B, C, D, and E is described by the following directed graphical model:



Suppose also that the marginal distributions of A and B are both binomial(2,1/4), the conditional distribution of C given $A = a$ and $B = a$ is Bernoulli$((a + b)/4)$, and the conditional distributions of D and E given $C = c$ are both Bernoulli$(c/2)$.

a) Compute $P(A = 1, B = 2, C = 1, D = 0, E = 1)$.

b) Find $P(A = 0, B = 0|C = 1)$.

c) Find $P(D = 0, E = 0|C = 1)$.