# Answer to Multiple Choice Question

As a graduate statistics student, I need to carefully evaluate which approach correctly calculates the probability of getting at least 4 out of 6 correct by chance alone.

The key phrase is "by chance alone" - this means we need to calculate the probability under the null hypothesis that the student is simply guessing (with 50% probability of success on each trial).

Let me analyze each option:

\*\*(A) Having the student repeat the experiment many times\*\*

This approach doesn't test the "by chance alone" scenario, but rather tests the student's actual ability. If she truly has some ability to distinguish the sodas, this would overestimate the probability of success by chance.

\*\*(B) Computer simulation with 50% chance per trial\*\*

This correctly models the null hypothesis scenario. Each trial is independent with a 50% success probability (random guessing). The simulation would approximate the binomial probability P(X ≥ 4) where X ~ Bin(6, 0.5).

\*\*(C) Repeating with many people\*\*

This approach potentially introduces variability in tasting ability across the population. Some people might have genuine ability to distinguish the sodas, which would not represent success "by chance alone."

\*\*(D) All methods are accurate\*\*

This cannot be true given the flaws in options A and C.

The most appropriate method is (B), which directly simulates the null hypothesis of random guessing. This is equivalent to calculating the exact binomial probability:

P(X ≥ 4) = P(X = 4) + P(X = 5) + P(X = 6) = (6C4)(0.5)^4(0.5)^2 + (6C5)(0.5)^5(0.5)^1 + (6C6)(0.5)^6(0.5)^0 = 0.344

Therefore, the correct answer is \*\*(B)\*\*.