

4. Probability, Random Variables, and Probability Distributions

Starter Quiz ·

AP Statistics

Name: _____ Score: _____

1. Probability is best described as the long-run...

- ☐ number of trials
- ☐ average of the data
- ☐ guess about the next trial
- ☐ relative frequency of an outcome

2. In a simulation, 12 of 100 trials gave the outcome of interest. Estimate the probability (as a decimal).

3. Rolling a fair die, what is $P(\text{even})$? Give a decimal.

4. $P(A)=0.3$, $P(B)=0.4$, $P(A \text{ and } B)=0.1$. Find $P(A \text{ or } B)$.

5. $P(A \text{ and } B) = 0.2$ and $P(B) = 0.5$. Find $P(A \mid B)$.

6. The number of heads in 3 coin flips is which kind of random variable?

- ☐ neither
- ☐ categorical
- ☐ continuous
- ☐ discrete

7. X wins 5 with prob 0.2, else 0. Find the mean $E(X) = 5(0.2)+0(0.8)$.

8. When subtracting two independent random variables, you subtract their variances.

- ☐ True ☐ False

9. Which is NOT one of the four binomial (BINS) conditions?

- ☐ a fixed number of trials
- ☐ the trials must be a random sample of the population
- ☐ binary outcomes

☐ independent trials

10. Which situation is geometric (not binomial)?

☐ roll a die until the first six

☐ count sixes in 10 rolls

☐ correct answers on a 5-question quiz

☐ count heads in 20 flips

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Answers ·

AP Statistics

1. **relative frequency of an outcome**

Probability = long-run relative frequency over many repetitions.

2. **0.12**

Estimate = successes / trials = $12/100 = 0.12$.

3. **0.5**

Even = $\{2,4,6\}$, so $3/6 = 0.5$.

4. **0.6**

$0.3 + 0.4 - 0.1 = 0.6$.

5. **0.4**

$P(A|B) = P(A \cap B)/P(B) = 0.2/0.5 = 0.4$.

6. **discrete**

It takes countable separate values $(0,1,2,3)$ – discrete.

7. **1**

$5(0.2) + 0(0.8) = 1$.

8. **False**

Variances ADD even for a difference – never subtract them.

9. **the trials must be a random sample of the population**

BINS = Binary, Independent, fixed Number, Same p. Random sampling isn't required.

10. **roll a die until the first six**

'Until the first success' $\rightarrow$ geometric; fixed n $\rightarrow$ binomial.