

2. A person plays the following game. He draws 1 card from a standard 52-card deck. If it's an ace, he chooses 1 of 2 doors. Behind one door is \$300, which he can exchange for.

Behind the other door is \$100.

If the card he draws is not an ace, he keeps the card and chooses again. If the second card matches the first card's denomination, he wins \$50. If the second card does not match the first, he wins nothing.

a) Find his expected winnings.

b) What is the most he should pay to play the game to win on average?

3. A student takes 12 credits and receives the following grades:

grade	A	B	C	D
# credits	6	2	3	1

He previously had 60 credits with a gpa of 2.8. Find his new gpa.

4. I. E and F are two events in a sample space. $P(E)=0.7$, $P(F)=0.6$ and $P(E^c \cap F^c)=0.1$.

a) Are E and F independent?

b) Find $P(E|F)$.

II. If $P(E)=0.75$, $P(F)=0.8$ and $P(E^c \cap F^c)=0.05$ are E and F independent? Find $P(E|F)$.

5. The events that runners I, II and III can run a mile in 4 minutes are independent and have probabilities 0.6, 0.9 and 0.7 respectively.

a) Find the probability that at least one runner will not run the mile in 4 min.

b) Find the probability that only runner II will finish in 4 min.

c) Find the probability that runners I or II, possibly both, will finish in 4 min.

6. A die is tossed 3 times.

a) What is the probability that the 2nd toss is a "6" given that there are exactly two "6"s?

b) Are the events that the '2nd toss is a "6" 'and 'there are exactly two "6"s ' independent?

7. Classify each random variable as continuous, infinite discrete or finite.

A coin is randomly selected from a box of coins containing nickels, dimes, quarters and pennies. Then the coin is returned to the box.

a) X is the money value of the coin.

b) Y is the un-rounded weight of the person choosing the coin.

c) N is the number of times a coin must be selected until a nickel is chosen.

8. I A person draws one card from a standard 52-card deck.

a) What are the odds he will select an ace?

b) What are the odds he will not select an ace?

II If the odds in favor of E are 2:9, find $P(E^c)$.

9. Classify each random variable as binomial or not. If binomial, give n, p, the mean and the standard deviation. If not binomial, say why not.

a) A shipment contains 100 games, two of which are defective. 10 games are selected at random and X is the number of defective games.

b) Games are continually produced so that 2% are defective. A sample of 10 games are selected at random and X is the number of defective games.

c) 1/3 of the population has blood type A+. Fifty people are selected at random and X is the number who have blood type A+.

d) A box contains 10 red, 6 blue and 4 green balls. Three are randomly selected without replacement. X= the number of green balls chosen.

10. Write the distribution of the random variable in 8d. Find $E(X)$.

11. X is a normally distributed random variable with mean 30 and unknown standard deviation.

$P(X > 25) = 0.8$. Find

a) $P(X < 35)$ b) $P(X > 35)$ c) $P(25 < X < 30)$

12. A set of grades is normally distributed with mean 70 and standard deviation 16.

i) Find a number a so that 60% of the grades are below a .

ii) Find a number b so that 15% of the grades are above b .

iii) Find $P(X < 80)$ where X is a randomly selected student's grade.

13. Assume that 6% of a large population has a non-communicable disease. 500 people are randomly selected and X is the number of those selected who have the disease.

a) Find $P(20 \leq X \leq 30)$.

b) Find the expected value and standard deviation of X .

c) Find the normal approximation to the probability in a.

14. 15 people are in a room. What is the probability that

a) at least two have the same birthday?

b) exactly two have the same birthday and there are no other repeats?