Intro to Probability Day 1 (Supplemental Homework Problems)

1)

Experiment Flip a single coin once Events A = coin lands on heads B = coin lands on tails C = coin lands on either heads or tails D = coin doesn't land on anythingFind S, A, B, C, D, P(A), P(B), P(C), P(D)Hint: One of the 4 events above is the same as S and another one is Ø

2)

Experiment

Flip a single coin twice (or flip a pair of coins once)

Events

A =both coins land on the same thing

B = at least one coin lands on heads

C = both coins land on tails

D = the first coin lands on tails

Find

 $S, A, B, C, D, P(A), P(B), P(C), P(D), P(S), P(\emptyset)$

3)

Experiment

Flip a single coin 3 times (or flip 3 coins all at the same time, once)

Events

A = The first and third coin land on the same thing

B = All coins land on the same thing

C = The 2nd coin lands on tails

D = The results of each flip alternate

Find

 $S, A, B, C, D, P(A), P(B), P(C), P(D), P(S), P(\emptyset)$

4)

Experiment

Flip a single coin 4 times (or flip 4 coins all at the same time, once)

Events

A = The third coin lands on tails

B = All coins land on the same thing

C = The 1st, 3rd, and 4th coin land on heads

D = The results of each flip alternate

E = The 1st and 3rd coin land on the same thing and the 2nd and 4th coin land on the same thing Find

 $S,A,B,C,D,E,P(A),P(B),P(C),P(D),P(E),P(S),P(\emptyset)$

5)

Experiment

Roll a single die once

Events

A = The die lands on an even number

B = The die lands on a multiple of 3

C = The die lands on a prime number

D = The die lands on 4

E = The die lands on a number bigger than 2

F = The die lands on 7

G = The die lands on a number less than 9

Find

 $S, A, B, C, D, E, F, G, P(A), P(B), P(C), P(D), P(E), P(F), P(G), P(S), P(\emptyset)$ Hint: One of the 7 events above is the same as *S* and another one is \emptyset

6)

Experiment

Roll a single die twice (or roll a pair of dice once)

Events

A = The total of the numbers on the die is 7

B = The total of the numbers on the die is at least 11

C = The total of the numbers on the die is at most 4

D = The absolute value of the difference of the numbers on the die is 2

E = You roll doubles

F = The first die lands on 5

G = The first die lands on an even number and the 2nd lands on an odd number Find

S, A, B, C, D, E, F, G, P(A), P(B), P(C), P(D), P(E), P(F), P(G), P(S), P(\emptyset)

7)

Experiment

Flip a single coin once then roll a single die once

Events

A = The die lands on 4

B = The coin lands on tails

C = The coin lands on heads and the die lands on an odd number Find

 $S, A, B, C, P(A), P(B), P(C), P(S), P(\emptyset)$

Hint: A couple of outcomes of this experiment are H5 and T3.

8)

Experiment

Flip a single coin then roll a single die then flip a coin once more (for this example, instead of labeling the outcomes of the coins as H and T, use a 1 for H and 0 for Tails. So instead of the outcome H5T, label it as 150)

Events

A = Both coins landed on an odd number

B = The number rolled on the die is a multiple of 3

C = The total of all 3 numbers is at least 5

D = The total of the first 2 numbers is 4

E = All 3 numbers are the same

Find

 $S, A, B, C, D, E, P(A), P(B), P(C), P(D), P(E), P(S), P(\emptyset)$

9)

Experiment

Play a single game of roulette

Events

A = The ball lands in an odd slot

B = The ball lands in a red slot

C = The ball lands in a green slot

D = The ball lands on a number that is a multiple of 3

E = The ball lands in a slot that is part of the 1st 12 bet F = The ball lands in a slot that is part of the 3rd 12 bet and is a black number

G = The ball lands on a number that is part of the 2nd column

Find

S, A, B, C, D, E, F, G, P(A), P(B), P(C), P(D), P(E), P(F), P(G), P(S), P(\emptyset)

10)

Experiment

Draw a single card from a standard poker deck

Events

A = Draw a heart

B = Draw a black card

C = Draw a red face card

D = Draw a king

E = Draw a card that has a number on it that is less than 5

Find

 $S, A, B, C, D, E, P(A), P(B), P(C), P(D), P(E), P(S), P(\emptyset)$

11)ExperimentSpin the spinner pictured below once



Events

A = The spinner lands on a red section

B = The spinner lands on a blue section

C = The spinner lands on an even number

D = The spinner lands on a multiple of 3

E = The spinner lands on a prime number

F = The spinner lands on a red odd number

G = The spinner lands on a number greater than 5

Find

 $S, A, B, C, D, E, F, G, P(A), P(B), P(C), P(D), P(E), P(F), P(G), P(S), P(\emptyset)$

12)

Experiment

Draw a single ball from the bag pictured below



Events

A = You draw a ball with an even number on it

B = You draw a ball with a prime number on it

C = You draw a yellow ball

D = You draw a ball that is both blue and even

E = You draw a ball with a number larger than 6 on it

F = You draw a ball that is both less than 7 and odd

Find

S, A, B, C, D, E, F, P(A), P(B), P(C), P(D), P(E), P(F), P(S), P(\emptyset)

13)ExperimentDraw a single ball from the bag pictured below



Events

A = You draw a ball with the number 3 on it

B = You draw a ball with the number 7 on it

C = You draw a ball with the number 5 on it

D = You draw a ball that has an even number on it that is also larger than 3

E = You draw a ball that has a prime number on it

Find

$S, A, B, C, D, E, P(A), P(B), P(C), P(D), P(E), P(S), P(\emptyset)$

Note: It's easy to make mistakes on this example and this example is in a sense the most important example, so let me explain a couple of things. Notice that there are DIFFERENT balls that have the SAME number on them. Let's focus on drawing an 8. If you draw the ball with an 8 on it that is on the left in the picture above, that is a DIFFERENT outcome than drawing the other ball with the 8 on it (the one on the right) because you drew different balls. So if DIFFERENT balls were drawn even with the same number on it, they are DIFFERENT outcomes. So labeling the outcomes with just the number 8 is not a good idea because then you don't know which one we're talking about. So my suggestion to you is to draw in something more in the picture above so that you can distinguish between the 2 balls with 8's on it. If I ask you to write down the even that you draw an 8, some answers that I expect are {8} or {8, 8}, but these are incorrect. If you write {8, 8} for example, which 8 stands for which ball. So you can add to

the labels on the balls in the picture above so that the 2 balls with 8's are now [a], and [b] and then you can write the event as $\{8_1, 8_2\}$ and that way when I see 8_1 I know which ball with an 8 on it you're talking about. So for example, the answer to event *B* is $B = \{7_1, 7_2, 7_3, 7_4\}$, and label this in the picture as well so I know which ball is 7_1 and so on.