


$$p(A) = \frac{\text{Number of A outcomes}}{\text{Number of possible outcomes}}$$

Assumes random selection  
 $0 \leq p(A) \leq 1$



$p(\text{Blue or White Marble})$   
 What is the probability of randomly selecting a blue or white marble?

40 White Marbles  
 10 Blue Marbles



$p(\text{Blue } \cup \text{ White Marble})$   
 What is the probability of randomly selecting a blue or white marble?

40 White Marbles  
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$p(\text{Blue } \cup \text{ White Marble})$   
 What is the probability of randomly selecting a blue or white marble?

$$\frac{10}{50} + \frac{40}{50} = 1.00$$

40 White	10 Blue
White	Blue

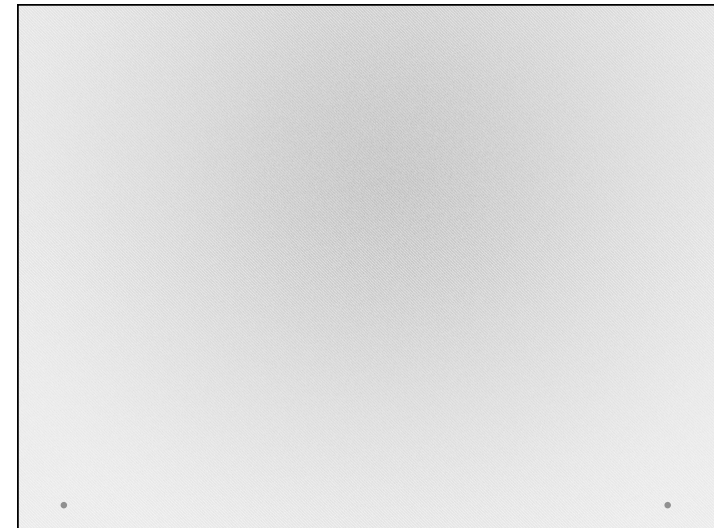


$$p(A) = \frac{\text{Number of A outcomes}}{\text{Number of possible outcomes}}$$

Assumes random selection  
 $0 \leq p(A) \leq 1$

$$p(A \cup B) = p(A) + p(B)$$

Assumes random selection  
 Assumes mutual exclusivity  
 $0 \leq p(A \cup B) \leq 1$



$p(H_1 \text{ and } H_2)$   
 What is the probability of getting  
 two heads on two flipped coins



$p(H_1 \cap H_2)$   
 What is the probability of getting  
 two heads on two flipped coins

$.50 \times .50 = 0.25$





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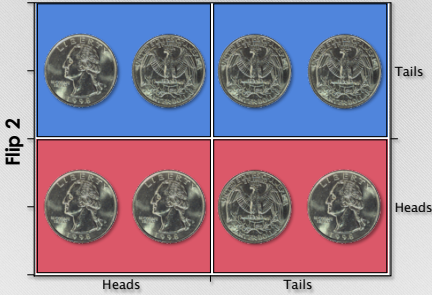
$$p(A \cup B) = p(A) + p(B)$$
 Assumes random selection  
 Assumes mutual exclusivity  
 $0 \leq p(A \cup B) \leq 1$

$$p(A \cap B) = p(A) \times p(B)$$
 Assumes random selection  
 Assumes independence  
 $0 \leq p(A \cap B) \leq 1$

$p(H_1 \cap H_2)$   
 What is the probability of getting two heads on two flipped coins  
 $.50 \times .50 = 0.25$



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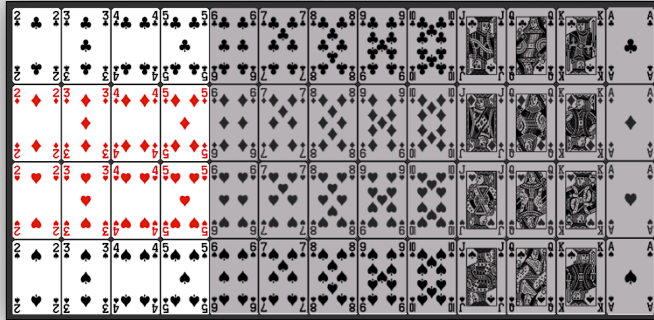
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 Assumes independence  
 $0 \leq p(A \cap B) \leq 1$

$p(\text{Card} > 5)$

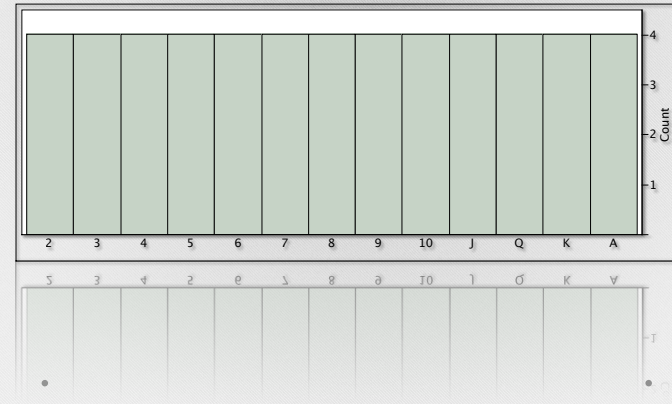
What is the probability of randomly selecting a card higher than 5 from a deck of cards (ace high).

$$\frac{36}{52} = 0.692$$



$p(\text{Card} > 5)$

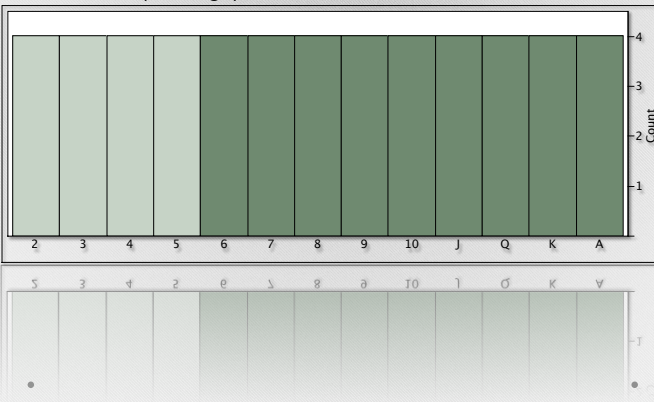
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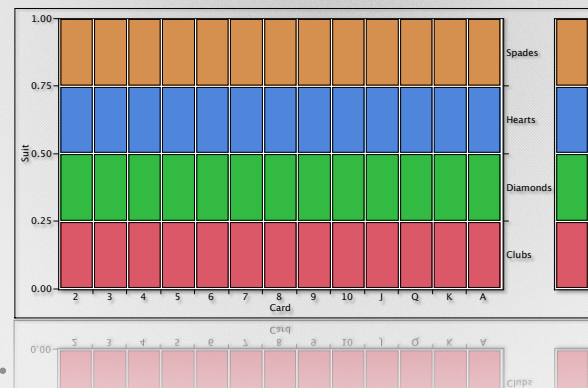
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What is the probability of randomly selecting a card higher than 5 from a deck of cards (ace high).

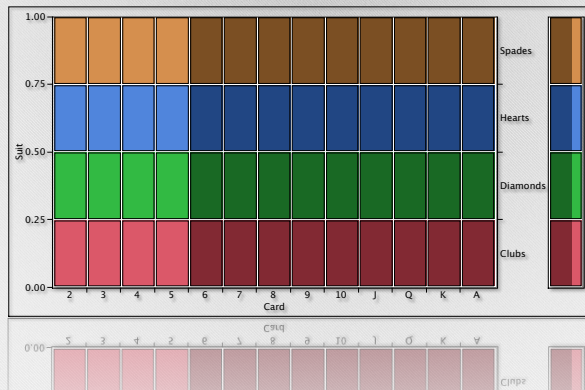
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$p(\text{Card} > 5)$

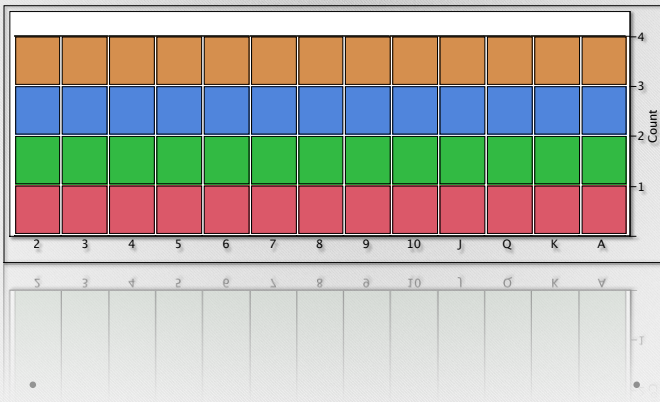
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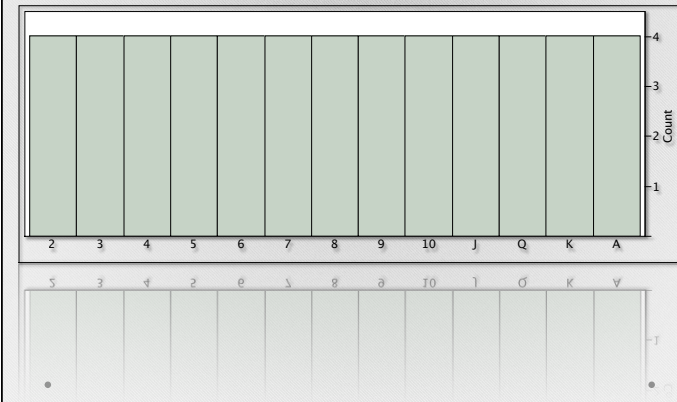
$p(2 < \text{Card} < 5)$

What is the probability of randomly selecting a 3 or 4 from a deck of cards.



$p(2 < \text{Card} < 5)$

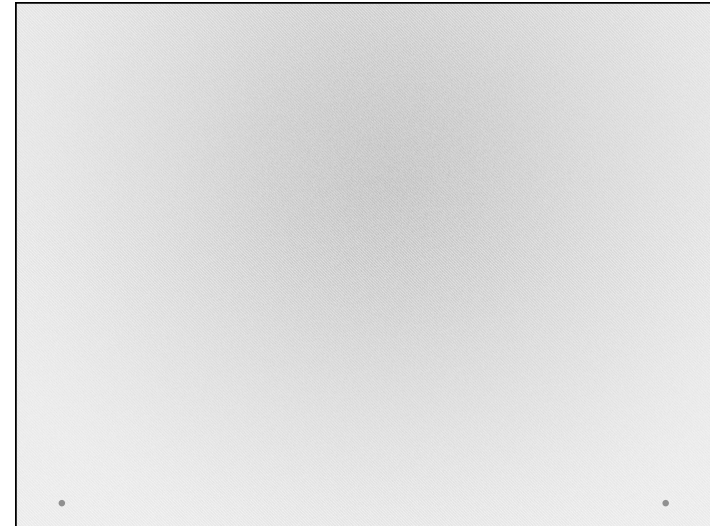
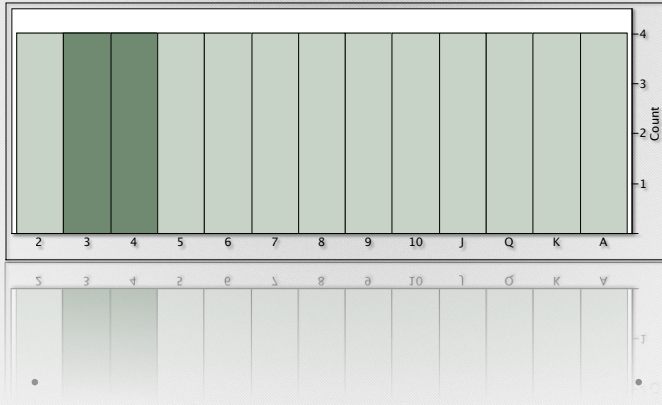
What is the probability of randomly selecting a 3 or 4 from a deck of cards.



$$p(2 < \text{Card} < 5)$$

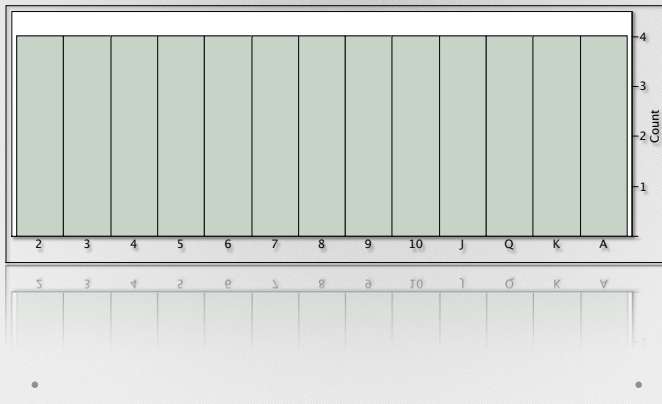
What is the probability of randomly selecting a 3 or 4 from a deck of cards.

$$\frac{8}{52} = 0.154$$



$$p(2 \leq \text{Card} \leq 5)$$

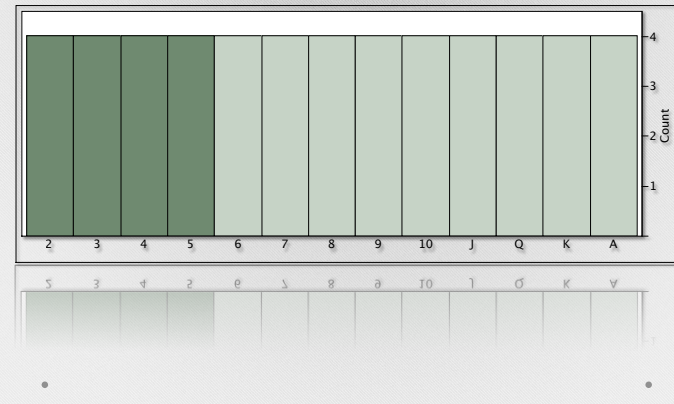
What is the probability of randomly selecting a 2, 3, 4, or 5 from a deck of cards.



$$p(2 \leq \text{Card} \leq 5)$$


What is the probability of randomly selecting a 2, 3, 4, or 5 from a deck of cards.

$$\frac{16}{52} = 0.308$$

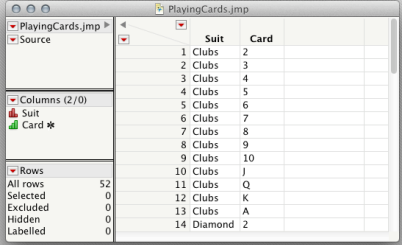




PlayingCards.jmp




All possible outcomes for drawing a single card

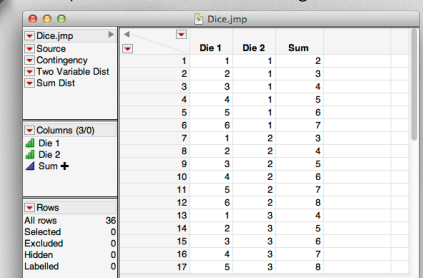


Suit	Card
1 Clubs	2
2 Clubs	3
3 Clubs	4
4 Clubs	5
5 Clubs	6
6 Clubs	7
7 Clubs	8
8 Clubs	9
9 Clubs	10
10 Clubs	J
11 Clubs	Q
12 Clubs	K
13 Clubs	A
14 Diamond	2

Dice.jmp



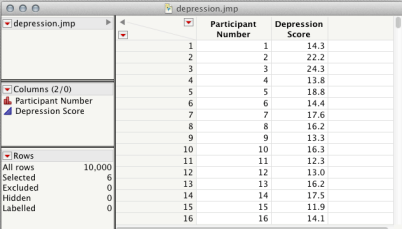
All possible outcomes for rolling two dice



Die 1	Die 2	Sum
1	1	2
2	2	3
3	3	4
4	4	5
5	5	6
6	6	7
7	1	3
8	2	4
9	3	5
10	4	6
11	5	7
12	6	8
13	1	4
14	2	5
15	3	6
16	4	7
17	5	8

BDI

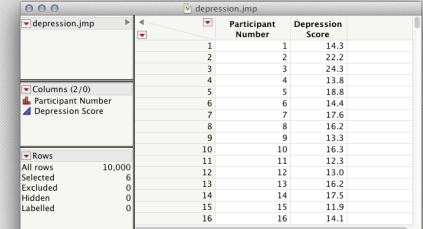
Depression scores (BDI) for 10000 individuals



Participant Number	Depression Score
1	14.3
2	22.2
3	24.3
4	13.8
5	18.8
6	14.4
7	17.6
8	16.2
9	13.3
10	16.3
11	12.3
12	13.0
13	16.2
14	17.5
15	11.9
16	14.1

BDI

$p(BDI \geq 18)$   
What is the probability of randomly selecting a person from this population who scored 18 or more?



Participant Number	Depression Score
1	14.3
2	22.2
3	24.3
4	13.8
5	18.8
6	14.4
7	17.6
8	16.2
9	13.3
10	16.3
11	12.3
12	13.0
13	16.2
14	17.5
15	11.9
16	14.1



$p(\text{BDI} \geq 1 \text{ Z-score})$

What is the probability of randomly selecting a person from this population who scored 1 or more standard deviations above the mean?

BDI



Participant Number	Depression Score
1	14.3
2	22.2
3	24.3
4	13.8
5	18.8
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7	17.6
8	16.2
9	13.3
10	16.3
11	12.3
12	13.0
13	16.2
14	17.5
15	11.9
16	14.1

IQ scores for 10,000 individuals

IQ



Subject Number	IQ
1	125
2	77
3	111
4	85
5	102
6	72
7	95
8	101
9	97
10	94
11	100
12	111
13	97
14	79

$p(\text{IQ} \geq 1 \text{ Z-score})$

What is the probability of randomly selecting a person from this population who scored 1 or more standard deviations above the mean?

IQ



Subject Number	IQ
1	125
2	77
3	111
4	85
5	102
6	72
7	95
8	101
9	97
10	94
11	100
12	111
13	97
14	79

