21. Titanic 1

On April 15, 1912, the Titanic struck an iceberg and rapidly sank with only 710 of her 2,204 passengers and crew surviving. Data on survival of passengers are summarized in the table below.

	Survived	Did not survive	Total
First class passengers	201	123	324
Second class passengers	118	166	284
Third class passengers	181	528	709
Total passengers	500	817	1317

a. Calculate the following probabilities. Round your answers to three decimal places.
   i. If one of the passengers is randomly selected, what is the probability that this passenger was in first class?
   ii. If one of the passengers is randomly selected, what is the probability that this passenger survived?
   iii. If one of the passengers is randomly selected, what is the probability that this passenger was in first class and survived?
   iv. If one of the passengers is randomly selected from the first class passengers, what is the probability that this passenger survived? (That is, what is the probability that the passenger survived, given that this passenger was in first class?)
   v. If one of the passengers who survived is randomly selected, what is the probability that this passenger was in first class?
   vi. If one of the passengers who survived is randomly selected, what is the probability that this passenger was in third class?

b. Why is the answer to part (a.iv) larger than the answer to part (a.iii)?

c. Why is the answer to part (a.v) larger than the answer to part (a.vi)?

d. What other questions can you ask and answer using information in the given table? List at least three.

7. One bag has 10 marbles, two of which are green. Another bag has 15 marbles, with 5 being green. If you randomly choose a bag, what is the chance you pull out a green marble?

10 marbles 2 green

15 marbles 5 green

$\frac{1}{2} \cdot \frac{2}{10}$ or(+, $\frac{1}{2} \cdot \frac{5}{15}$

$\frac{2}{20} + \frac{5}{30} = \frac{6}{60} + \frac{10}{60} = \boxed{\frac{16}{60} = 27\%}$

8. If your friend takes a card from a standard deck and hands you the rest of the deck, what is the chance you will draw a face card?

Friend face card AND I draw face OR friend not face card AND I draw face

$\frac{12}{52} \cdot \frac{11}{51} + \frac{40}{52} \cdot \frac{12}{51} = \boxed{\frac{3}{13} = 23\%}$

9. If you draw two cards from a deck without replacement, what is the chance you'll your second card drawn will be a spade?

draw spade · draw spade + draw ~spade · draw spade

$\frac{13}{52} \cdot \frac{12}{51} + \frac{39}{52} \cdot \frac{13}{51} = \frac{156}{2652} + \frac{507}{2652} = \frac{663}{2652}$

$\frac{1}{6}$

$= \boxed{25\%}$

10. One bag contains the letters PMQTZW. Bag 2 contains the same letters. You reach into Bag 1, grab 1 letter, and put it into Bag 2. If you now reach into Bag 2, what is the chance you will pull out a Q?

PMQTZW

PMQTZW Q

$\frac{1}{6} \cdot \frac{2}{7} + \frac{5}{6} \cdot \frac{1}{7}$

$\boxed{\frac{1}{6} = 16.7\%}$

11. If you toss a coin, roll a die, and draw a card from a standard deck, what is the probability that you get a heads, a 5 and a Queen?

P(heads ∪ 5 ∪ Q) =

$\frac{1}{2} \cdot \frac{1}{36} \cdot \frac{4}{52} = \frac{16}{1584} = \boxed{\frac{1}{99} = 1\%}$

12. If you toss a coin, roll a die, and draw a card from a standard deck, what is the probability that you get a tails, a 6, and a red card?

P(tails ∪ 6 ∪ red) =

$\frac{1}{2} \cdot \frac{5}{30} \cdot \frac{26}{52} = \boxed{\frac{130}{1584} = 8\%}$

13. A bag contains 10 green tiles, 4 yellow tiles, and 6 blue tiles. You draw one tile, replace it, then draw a second tile. What is the chance that the second tile you draw is yellow?

P(second is yellow) = $\frac{4}{20} = \boxed{\frac{1}{5} = 20\%}$