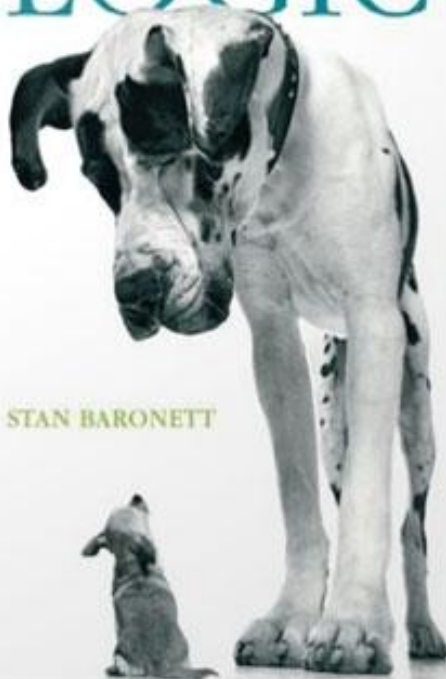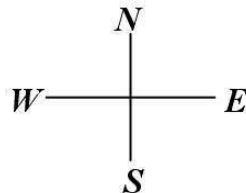# LOGIC

STAN BARONETT

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

For the following inferences calculate the probability of the conclusion being true, if the premises are true. Then determine if the inference is *valid* or *invalid.*

1) <u>Shane was born in a month whose first letter is "A."</u>
   Shane was born in April.

1) _____

2) Shane was born in a month whose first letter is "A."
   <u>Shane was born in a month that has 31 days</u>.
   Shane was born in August.

2) _____

3) Shane was born in a month whose first letter is "J."
   <u>Shane was born in a month that has 31 days.</u>
   Shane was born in June.

3) _____

4) Carly's birthday is this week.
   <u>Carly's birthday is on a day whose first letter is "T."</u>
   Carly's birthday is on Tuesday.

4) _____

5) Carly's birthday is this week.
   <u>Carly's birthday is on a day whose first letter is "S."</u>
   Carly's birthday is on Sunday.

5) _____

6) Carly's birthday is this week.
   <u>Carly's birthday is on a day whose first letter is "M."</u>
   Carly's birthday is on Monday.

6) _____

Refer to the following chart.

$$N$$
$$W \quad + \quad E$$
$$S$$

Los Angeles   Denver   St. Louis   Chicago   New York City   Boston

(1) Show whether the inference structures are valid or invalid. (2) If an inference is invalid, then substitute cities from the above chart for the variables to get true premises and a false conclusion.

7) *X* is east of *Y*
   <u>*Z* is west of *Y*.</u>
   X is west of *Z*

7) _____

8) *X* is west of *Y*
   <u>*Y* is west of *Z*</u>
   X is west of *Z*

8) _____

9) *X* is east of *Y*
   <u>*Z* is east of *Y*</u>
   X is east of *Z*

9) _____

10) *X* is east of *Y*
   <u>*X* is east of *Z*</u>
   Y is east of *Z*

10) _____

For the following: (1) reveal the logical structure of the inference, and (2) show whether it is valid or invalid.

11) John is younger than Mike.
   John is younger than Sue.
   <u>Sue is younger than Jane</u>.
   Mike is younger than Jane.

11) _____

12) John is younger than Mike.
   John is younger than Sue.
   <u>Jane is younger than Mike</u>.
   Jane is younger than John.

12) _____

13) New York City has a larger population than Chicago.
   Pittsburgh has a larger population than Chicago.
   <u>Los Angeles has a larger population than Chicago</u>.
   New York City has a larger population than Los Angeles.

13) _____

14) New York City has a larger population than Paris.
   Paris has a larger population than Chicago.
   <u>Chicago has a larger population than Pittsburgh</u>.
   New York City has a larger population than Pittsburgh.

14) _____

Determine whether or not the following passages contain inferences.

15) I like candy. I love chocolate. I hate peanuts. Also, I don't care for circus acts or water sports. It's OK if you like that stuff.

15) _____

16) More damage was done last year from hurricanes than earthquakes. There was 100 million dollars damage last year from hurricanes. There was 70 million dollars damage last year from earthquakes.

16) _____

17) Newspapers are a good source of in-depth news and they are easily accessible. Weekly magazines are good source of in-depth news and they are easily accessible. PBS, CNN, and CSPAN are good sources of in-depth news and they are easily accessible. There is no reason why anyone should remain ignorant of what's going on in the world.

17) _____

18) It follows from the fact that she eats pork, chicken, beef, mutton, veal, venison, turkey, and fish, that she must not be a vegetarian.

18) _____

Pick out the *premises* and *conclusions* of the following inferences.

19) Hamburgers are loaded with saturated fat and sodium. Pizza is loaded with saturated fat and sodium. Too much saturated fat and sodium is harmful to your heart. Jim takes in too much saturated fat and sodium. It follows Jim is harming his heart.

19) _____

20) Soy bean curd has no taste. The fat in hamburgers is what gives them their great taste. The fat in pizza is what gives it great taste. Food without fat tastes bland. Soy bean curd

has fat.
no

20) _____

21) Paris is called the "City of Lights." Las Vegas is also called the "City of Lights." So, there must be at least two cities with the same nickname.

21) _____

22) Paris' Eiffel Tower is three times as tall as the one in Las Vegas. The Luxor Pyramid in Las Vegas is half the size of the original in Egypt. The Statue of Liberty in New York is four times the one in Las Vegas. Thus, every object in Las Vegas is smaller than in other cities.

22) _____

For each of the following passages, decide whether it is an inference or an explanation.

23) Computers will soon be in every home because the cost of buying one goes down dramatically every year.

23) _____

24) There has been an overall decrease in violence among humans worldwide throughout recorded history. Biologically speaking, this is because the genetic characteristics for nonviolence have been selected over time by the species.

24) _____

25) Since there is biological evidence that the genetic characteristics for nonviolence have been selected over time by the species, we should see an overall decrease in violence among humans worldwide in the coming centuries.

25) _____

26) She just inherited one million dollars from a rich relative, so she will quit her job soon.

26) _____

27) She quit her job today because she inherited one million dollars from a rich relative.

27) _____

For each of the following *enthymemes* you are to supply either missing premises or conclusions. First, try to make the inference *valid.* Second, try to make the inference *strong.* Explain your answers.

28) I am eating a banana; therefore, I am eating a fruit.

28) _____

29) I am eating a fruit; therefore, I am eating a banana.

29) _____

30) Shane owns a Sony; so, it must be a TV.

30) _____

31) Shane owns a TV; so, it must be a Sony.

31) _____

1) Probability = 1/2.   Invalid
2) Probability = 1.   Valid.
3) Probability = 0.   Invalid
4) Probability = 1/2.   Invalid.
5) Probability = 1/2.   Invalid.
6) Probability = 1.   Valid.
7) Invalid.
   Let X = "Boston", Y = "New York City", and Z = "Chicago".
8) Valid. Let X = "Denver", Y = "Chicago", and Z = "Boston".
9) Invalid.
   Let X = "Denver", Y = "Los Angeles", and Z =" Saint Louis".
10) Invalid.
   Let X = "Chicago", Y = "Denver", and Z = "Saint Louis".
11) Invalid: Let J = "5", M = "10", S = "7", and E = "8".

   J is younger than *M*
   J is younger than *S*
   <u>*S* is younger than *E*</u>
   M is younger than *E*
12) Invalid: Let J = "5", M = "10", S = "7", and E = "8".

   J is younger than *M*
   J is younger than *S*
   <u>*E* is younger than *M*</u>
   E is younger than *J*
13) Invalid: Let N = "9", C = "4", P = "7", and L = "10".

   N has a larger population than C
   P has a larger population than C
   <u>L has a larger population than C</u>
   N has a larger population than L
14) Valid

   N has a larger population than P
   P has a larger population than C
   <u>C has a larger population than H</u>
   N has a larger population than H
15) Not an inference
16) Inference
17) Inference
18) Inference
19) *Premises* ☐ Hamburgers are loaded with saturated fat and sodium. Pizza is loaded with saturated fat and sodium. Too much saturated fat and sodium is harmful to your heart. Jim takes in too much saturated fat and sodium.
   Conclusion☐ Jim is harming his heart.
20) *Premises* ☐ The fat in hamburgers is what gives them their great taste. The fat in pizza is what gives it great taste. Food without fat tastes bland. Soy bean curd has no fat.
   Conclusion ☐ Soy bean curd has no taste.
21) *Premises* ☐ Paris is called the "City of Lights." Las Vegas is also called the "City of Lights."
   Conclusion ☐ There must be at least two cities with the same nickname.
22) *Premises* ☐ Paris' Eiffel Tower is three times as tall as the one in Las Vegas. The Luxor Pyramid in Las Vegas is half the size of the original in Egypt. The Statue of Liberty in New York is four times the one in Las Vegas.

Concl usion☐ Every object in Las Vegas is smaller than in other cities.
23) This is an inference.
The statement, "The cost of buying one (a computer) goes down dramatically every year," is a premise used to support the conclusion (a prediction) "Computers will soon be in every home."
24) This is not an inference.
The first statement, "There has been an overall decrease in violence among humans worldwide throughout recorded history," asserts what is believed to be a fact, and the second statement, "Biologically speaking, this is because the genetic characteristics for nonviolence have been selected over time by the species," provides an *explanation* for that fact.
25) This is an inference.
The statement, "There is biological evidence that the genetic characteristics for nonviolence have been selected over time by the species," is a premise used to support the conclusion (a prediction), "We should see an overall decrease in violence among humans worldwide in the coming centuries."
26) This is an inference.
The statement, "She just inherited one million dollars from a rich relative," is a premise used to support the conclusion (a prediction), "She will quit her job soon."
27) This is not an inference.
The statement, "She quit her job today," asserts a fact, and the statement, "She inherited one million dollars from a rich relative," provides an *explanation* for that fact.
28) *Missing Premise:* All bananas are fruit.
This will make the inference *valid*. In addition, since the *truth content* of the added premise is *true*, if the first premise is true, then it will be a *sound* inference.

Missing Premise: The vast majority of bananas are fruit.
This will make the inference *strong*. However, since we saw above that we can create a *sound* inference, this would *not* be the best reconstruction.
29) *Missing Premise:* All fruit are bananas.
This will make the inference *valid*. However, since the *truth content* of the added premise is *false*, this reconstruction will be an *unsound* inference.

Missing Premise: The vast majority of fruit are bananas.
This will make the inference *strong*. However, since most fruit are not bananas, this is probably a false statement as well. This fact makes the inference not cogent.
30) *Missing Premise:* All Sonys are TVs. This will make the inference *valid*. However, since the *truth content* of the added premise is *false*, then this reconstruction will be an *unsound* inference (Sony makes many kinds of products).

Missing Premise: The vast majority of Sonys are TVs.
This will make the inference *strong*. However, we would have to gather data to see if the truth content of this assertion is true or false. If it is true, then the inference is cogent; if it is false, then the inference is not cogent.
31) *Missing Premise:* All TV's are Sonys.
This will make the inference *valid*. However, since the *truth content* of the added premise is *false*, this reconstruction will be an *unsound* inference.

Missing Premise: The vast majority of TV's are Sonys.
This will make the inference *strong*. However, we would have to gather data to see if the truth content of this assertion is true or false. If it is true, then the inference is cogent; if it is false, then the inference is not cogent.