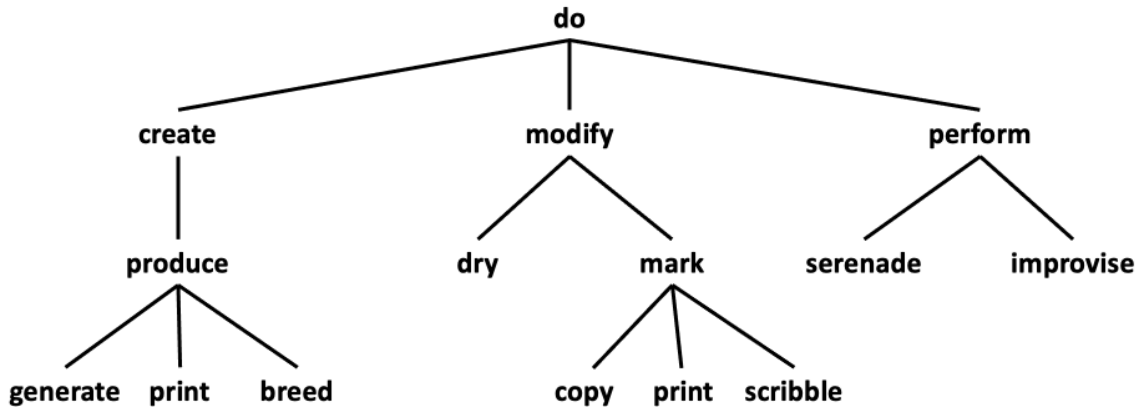
(K) Wordnet Battleship (1/6) [15 Points]

A new board game craze is sweeping the globe: Wordnet Battleship! This game is similar to the strategy guessing game Battleship where two players try to guess where the other one has placed a fleet of ships on a ruled grid. But unlike the traditional Battleship game, Wordnet Battleship replaces the ruled grid with a tree diagram of words that are hierarchically associated to each other based on their meaning. The diagram works like this: The word at the top of the diagram has the most general meaning. The diagram then splits into a set of words that are a bit more specific in meaning than the word at the top. Each of those words splits into more words that are more specific than the word above them, and so on.

For example, in the wordnet diagram below, the verb *do* splits into *create*, *modify*, and *perform*, which are more specific types of doing. The verb *perform* then splits into the verbs *serenade* and *improvise*, which are two specific ways to perform. Since the diagram is based on word meaning, words with multiple meanings appear in multiple different locations in a wordnet based on their individual separate meanings.



The wordnet diagram above is the right size for playing a beginner-level round of the game Wordnet Battleship. In this level of play, each player has three ships that must be strategically placed on the diagram based on a set of rules. The 3 ships are:

- A **frigate**, which takes up 3 positions on a wordnet diagram
- A **yacht**, which takes up 2 positions on a wordnet diagram
- A **rowboat**, which takes up 2 positions on a wordnet diagram

The rules for concealing ships within a wordnet diagram are:

1. Each ship must be placed on a chain of directly connected words in the wordnet diagram. The chain may not use two words on the same level. For example, a frigate can be placed on *scribble-mark-modify*, but it cannot be placed on *copy-print-scribble*, *do-mark-copy*, or *copy-mark-scribble*.
2. A player's ships cannot overlap. For example, if a player places their frigate on *generate-produce-create* on their wordnet diagram, they can't also place their yacht on *breed-produce*.
3. The two players have distinct copies of the same wordnet diagram on which to conceal their ships. It is therefore entirely possible for them to place their ships on the same positions as their opponent. For example, both players might coincidentally place their yacht on *print-produce*.

(K) Wordnet Battleship (2/6)

Once both players have placed their ships, they begin the game. The players take turns trying to guess the specific positions in their opponent's wordnet diagram where a ship is hiding. To make a guess, a player says the relevant word out loud and uses that word in a sentence that indicates the meaning of the word. Their opponent follows up with either the reply "Miss" (if no part of a ship is covering the word with that meaning on their own wordnet diagram) or "Hit" (if part of a ship is covering the word with that meaning on their own wordnet diagram). When the final part of a ship is hit for a given ship, the opponent says, "Hit—you have sunk my [NAME OF SHIP]."

Two players have just finished playing a round of the beginner level of Wordnet Battleship using the wordnet diagram shown on the previous page. Below are two tables listing all the guesses and responses that transpired during this game. To make it easy for you to keep track of who guessed what, we have grouped together all of Player 1's guesses with the corresponding responses from Player 2 in one table, and all of Player 2's guesses with the corresponding responses from Player 1 in another table.

Turn	***Player 1's guess***	***Player 2's response***
1	**Dry:** Can you tell me how to dry tomatoes?	Miss
2	**Print:** Please print your name on your exam.	Miss
3	**Modify:** You cannot modify your apartment	Hit
4	**Do:** You need to do something!	Hit
5	**Mark:** I will mark the door with a secret symbol.	Hit—you have sunk my frigate.
6	**Print:** The publisher will print 3 million books.	Miss
7	**Produce:** What will the new factory produce?	Hit
8	**Perform:** Many students perform at the talent show.	Hit
9	**Serenade:** The musician will serenade the diners.	Hit—you have sunk my yacht.
10	**Create:** I want to create a new type of microscope.	Miss
11	**Breed:** My neighbors breed poodles.	Miss

Turn	***Player 2's guess***	***Player 1's response***
1	**Generate:** The device can generate electricity.	Miss
2	**Modify:** I would like to modify my car.	Hit
3	**Mark:** Please do not mark your library books.	Hit
4	**Do:** What does this machine do?	Miss
5	**Scribble:** My niece likes to scribble on the walls.	Hit—you have sunk my rowboat.
6	**Perform:** Will you perform on this stage?	Miss
7	**Produce:** Both countries produce dairy products.	Hit
8	**Breed:** They breed goldfish.	Miss
9	**Create:** The company must create a new product.	Hit
10	(a)	Hit—you have sunk my frigate.
11	(b)	Hit—you have sunk my yacht.

(K) Wordnet Battleship (3/6)

K1. Two of Player 2's guesses are missing. Fill in examples of what these guesses might have been. Your answer should include both the word and an example sentence that clearly illustrates the meaning of that word given its position in the wordnet diagram (there are many possible example sentences). You can write your answers on page 6.

K2. Where are Player 2's ships (that is, where are the ships that Player 1 is trying to sink)? Your answer should simply list the words without example sentences. When listing the words, order does not matter. You can write your answers on page 6.

The advanced level of Wordnet Battleship requires a different and larger wordnet diagram with nouns instead of verbs. In this level of play, each player has the following fleet of 6 ships:

- An **aircraft carrier**, which takes up 5 positions
- A **battleship**, which takes up 4 positions
- A **cruiser**, which takes up 3 positions
- A **submarine**, which takes up 3 positions
- A **destroyer**, which takes up 2 positions
- A **patrol boat**, which takes up 2 positions

Otherwise the game proceeds just like the version seen previously.

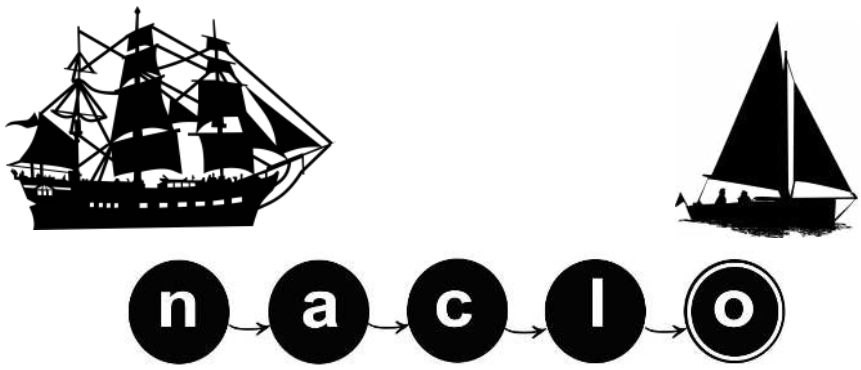
The next two pages contain the record of a game of advanced Wordnet Battleship. This game was played between Player 3, whose guesses are on Page 4/6, and Player 4, whose guess are on Page 5/6. Although you have access to this game record, you do not have access to the wordnet diagram that the players were referring to. Instead, you must figure out the structure of this diagram based on the record of the game.

For this game, you can assume the following:

- Every position in the wordnet diagram is guessed by at least one of the players.
- Answers (k) appears twice—as the final answer in the first table and the final answer in the second table. This answer should be exactly the same in both positions, using the same word and the same example sentence.
- All of the blanks in the rightmost column should be filled with a single word (either *Hit* or *Miss*).

K3. Fill in the blanks indicated in the tables on the next two pages. If there are multiple correct answers, you only need to give one. You can write your answers on page 6.

Note: This problem is based on the WordNet project. You can learn more about WordNet at https://wordnet.princeton.edu.



(K) Wordnet Battleship (4/6)

Record of second game—Table 1:

Turn	*Player 3's guess*	*Player 4's response*
1	**Object:** An object sat on the table.	Hit
2	**Publication:** Every publication on the shelf has a green cover.	Hit
3	**Magazine:** I tore a picture from the magazine.	Hit—you have sunk my cruiser.
4	**Scientist:** The scientist ran an experiment.	Miss
5	**Containerful:** I used one containerful of cocoa powder.	Hit
6	**Spoonful:** A spoonful of sugar helps the medicine go down.	Hit—you have sunk my destroyer.
7	**Queen:** The queen rules over her country with compassion.	(a)
8	**Physical entity:** Anything made out of matter is a physical entity.	(b)
9	**Thrower:** Many sports require you to be a thrower.	(c)
10	**Prime minister:** The prime minister will lower taxes.	Miss
11	**Person:** I know a person who can juggle seven pineapples.	(d)
12	**Centimeter:** The acorn was about one centimeter in diameter.	(e)
13	**Ruler:** _____(f)_____	Hit—you have sunk my battleship
14	**Ball:** The ball rolled across the field.	Miss
15	**Pitcher:** The pitcher threw the ball.	Miss
16	**Instrument:** An instrument is a device that require skill.	Hit
17	**Book:** Every book by Charles Dickens is entertaining.	Miss
18	**Written communication:** Literature is a form of written communication that lasts through the centuries.	(g)
19	**Communication:** I am expecting a communication from her.	(h)
20	**Play:** _____(i)_____	Hit—you have sunk my submarine
21	**Event:** Please add this event to your calendar.	Hit
22	**Social event:** Many of my friends will attend the social event.	Hit
23	**Ruler:** _____(j)_____	Hit—you have sunk my patrol boat.
24	**Ball:** Everyone who was invited to the ball wore elegant outfits.	Hit
25	**Abstract entity:** A concept is an abstract entity.	Hit
26	(k)	Hit—you have sunk my aircraft carrier.

(K) Wordnet Battleship (5/6)

Record of second game—Table 2:

Turn	*Player 4's guess*	*Player 3's response*
1	**Event:** An important event occurred yesterday.	Hit
2	**Business event:** A business event can be anything that happens in a business context.	Hit
3	**Construction:** The construction of the bank took two days.	Miss
4	**Publication:** _____(l)_____	Hit—you have sunk my submarine.
5	**Quantity:** You will need a quantity of yarn.	Hit
6	**Abstract entity:** An abstract entity cannot be touched.	Hit
7	**Containerful:** Please add a containerful of orange juice.	Hit
8	**Envelope:** The envelope contains a letter.	Miss
9	**Magazine:** I tore a picture from the magazine.	Miss
10	**Pitcher:** On the table, there is a glass pitcher holding flowers.	Hit
11	**Concert:** I am excited to go to the concert.	Miss
12	**Container:** The container for these toys is made of wood.	Hit—you have sunk my destroyer.
13	**Pitcher:** _____(m)_____	Hit—you have sunk my battleship.
14	**Social event:** My schedule has room for one more social event.	Hit
15	**Feast:** The feast lasted for over nine hours.	Hit
16	**Show:** The show is scheduled for Saturday.	Hit
17	**Play:** _____(n)_____	Hit—you have sunk my cruiser.
18	**Publication:** Each publication in the bin had a bar code on it.	(o)
19	**Entity:** An entity can be physical or abstract.	(p)
20	**Length:** Please bring me a length of string.	(q)
21	**Physical entity:** Happiness is not a physical entity.	(r)
22	**Object:** Every object needs to be cleared from the path.	(s)
23	**Microscope:** The biologist peered into the microscope.	(t)
24	**Equipment:** Many facilities have places to store equipment.	(u)
25	**Book:** _____(v)_____	Hit—you have sunk my aircraft carrier.
26	(k)	Hit—you have sunk my patrol boat.

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(K) Wordnet Battleship (6/6)

K1. Write examples of what Player 2's guesses might have been.

a.

b.

K2. Where are Player 2's ships? Next to each ship name, write the appropriate words.

yacht rowboat

frigate

K3. Provide entries for the empty cells in the record of Player 3 and Player 4's game.

a. b. c. d. e.

f.

g. h.

i.

j.

k.

l.

m.

n.

o. p. q. r. s. t. u.

v.