THINKING CRITICALLY – WORKSHEET 2 LOGICAL ARGUMENTS

Some questions WILL require the Internet. The Internet is a supplement to, not a substitute for, your brain. **Part I: A Pattern To What People Say**

Start by watching the following Youtube videos: Critical Thinking Part 1 and 2, by techNyouvids.

Vocabulary: In an academic sense, an <u>argument</u> is what someone uses to support an idea. Not a shouting match. Arguments are made up of a set of <u>premises (or assumptions)</u> and a <u>conclusion</u>, but <u>logic</u> is in there, somewhere. Everything that anyone thinks they "know" to be true or false, they learned by making or hearing some argument. This just means, we have reasons why we think we know things. Often it's not an explicit or even a good argument. Bad arguments are often called "rationalizations". To know something, we need to be able to personally argue it, well (recall: knowledge is a well-justified, true, belief).

- 1. Use the Internet (properly, like we discussed) and briefly describe these three concepts related to an argument, AS SIMPLY AS YOU CAN (find multiple sources with different phrasings so you can write them in your own words):
 - Assumptions/Premises:
 - Logic:
 - Conclusion:

People almost never state their full argument. Figuring out people's hidden assumptions and logic is the key to thinking critically.

2. If you think someone's argument is wrong, how would you analyze or investigate each of the three "parts"?

Vocabulary: We can categorize logic into two different "kinds": <u>deductive</u>, and <u>inductive</u>.

3. Use the Internet (properly, like we discussed) to define deductive reasoning. We will define inductive reasoning as something like "good logical inference, which is not deductive".

• If inductive reasoning is not deductive, what does that imply about the certainty of the conclusion?

Vocabulary: Deductive arguments, specifically, use some extra terminology:

• Good logic is called <u>valid</u>. If the premises are true and the logic is valid, the argument is said to be <u>sound</u>, and this means the conclusion MUST be true – it is guaranteed! You may ask, "how can we have something guaranteed to be true when we just said nothing is guaranteed". In reality, the conclusion of a deductive argument is only guaranteed IF we can show the premises and logic are true and valid. These seem to always take inductive arguments to show, which cannot be guaranteed.

- 4. Test your understanding of validity, soundness, truthiness, and arguments: for each of the three statements below, say whether it is possible for the assumptions, logic, and conclusions to be true, if that statement is true. Assume all statements refer to deductive arguments.
 - a) "Your logic is invalid." b) "Your argument is unsound." c) "Your conclusion is false."

The following are variations on some basic structures in logic (modus ponens, and modus tollens). Don't worry: we will NOT be covering logic in depth. Think of all logical possibilities to answer these – think: what can I REALLY, DEFINITELY conclude?

- 5. Premises: 1) If Billy eats the stinky sandwich, then Billy will get sick. 2) Billy ate the stinky sandwich.
 - a. As long as the premises are true, what can you conclude?
 - b. Does this involve deductive or inductive logic?
- 6. Premises: 1) If Billy eats the stinky sandwich, then Billy will get sick. 2) Billy didn't eat the stinky sandwich.
 - a. As long as the premises are true, what can you conclude? (Note: this does not say eating the stinky sandwich is the ONLY way Billy can get sick.)
 - b. Does this involve deductive or inductive logic?
- 7. Premises: 1) If Billy eats the stinky sandwich, then Billy will get sick. 2) Billy got sick.
 - a. As long as the premises are true, what can you conclude? (Note: this does not say eating the stinky sandwich is the ONLY way Billy can get sick.)
 - b. Does this involve deductive or inductive logic?
- 8. Premises: 1) If Billy eats the stinky sandwich, then Billy will get sick. 2) Billy didn't get sick.
 - a. As long as the premises are true, what can you conclude?
 - b. Does this involve deductive or inductive logic?
- 9. Premises: 1) If Billy eats the stinky sandwich, then Billy will probably get sick. 2) Billy didn't get sick.
 - a. As long as the premises are true, what can you conclude?
 - b. Does this involve deductive or inductive logic?

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Part II: How logic and arguments fail

<u>Logical fallacies</u> and <u>cognitive biases</u> are related concepts. Logical fallacies come in two types, formal and informal. Informal fallacies only show the argument is flawed when it is used in an absolute (deductive) sense, but <u>may</u> be reasonable if used more loosely (inductively).

Take the <u>argument from popularity</u> logical fallacy:

"All your friends are jumping off bridges, so it must be a good idea; you should do it, too."

This is clearly false because it is stated in absolute terms. If we state it more loosely, it becomes more reasonable. From xkcd comics, http://xkcd.com/1170/:



List of Fallacies and Cognitive Biases

Fill in the missing entries/descriptions/examples. When adding an entry, focus mostly on INFORMAL fallacies.

This list is for your reference so pick the fallacies that seem the most useful to you, when filling them out.

- 1. Non-sequitur:
 - <u>Description</u>: This means "does not follow" this is the most generic term for a logical fallacy. Only use this if no others are appropriate. This is best used when two statements are completely unrelated.
 - <u>Example</u>: "I was born in 1983, therefore the sky is blue."
 Being born in 1983 has nothing to do with the sky being blue.

2. Dunning-Kruger effect (cognitive bias):

- <u>Description</u>: People more competent in a subject tend to rate themselves as <u>less</u> competent. People less competent in a subject tend to rate themselves as <u>more</u> competent.
- <u>Example:</u>

3. Fallacy fallacy (aka Argument from fallacy):

- <u>Description</u>:
- <u>Example</u>: Billy: "I was born in 1983, therefore the sky is blue." George: "Since Billy's argument contains the non-sequitur logical fallacy, the logic is invalid. Since the logic is invalid, the sky must not be blue."
- Noticing a bad argument can convince us that the conclusion is false, even though it shouldn't. Philosopher Daniel Dennett had this to say: "There's nothing I like less than bad arguments for a view that I hold dear."

4. False choice:

- <u>Description</u>:
- Examples: 1) There are two kinds of people in this world, thinkers and doers.
 2) A husband says, "I always put the toilet seat down." His wife says, "You never put the toilet seat down." Either the husband is wrong or the wife is wrong.

5. Straw man argument:

- <u>Description</u>:
- <u>Example</u>:
- Recommendation: use the opposite tactic, called the **principle of charity**: which means to examine an argument in the best light, first: give the arguer the "benefit of the doubt".

6. Ad hominem:

- <u>Description</u>:
- <u>Example</u>:

7. Argument from authority:

- <u>Description</u>:
- <u>Example</u>:

8. Confirmation bias:

- <u>Description</u>:
- <u>Example</u>:
- 9.

(Add more fallacies/biases from here on)

- <u>Description</u>:
- Example:

10.

- <u>Description</u>:
- <u>Example</u>:

11.

- <u>Description</u>:
- <u>Example</u>:

12.

- <u>Description</u>:
- <u>Example</u>:

13.

- <u>Description</u>:
- <u>Example</u>:

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- <u>Example</u>:

16.

- <u>Description</u>:
- <u>Example</u>:

17.

- <u>Description</u>:
- <u>Example</u>:

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Part III: Name that logical fallacy - Put what you learned to the test

IF THERE IS ONE, identify the <u>specific</u> fallacies or cognitive biases (there may be more than one fallacy or bias, and some are not included on the list of fallacies and cognitive biases I provided, below).

- 1. "You're either with me or you're against me."
- 2. "How can she be a competent office manager when she voted for Obama?!"
- 3. "He must be correct, he has a British accent!"
- 4. "Scientists say the climate is warming, but what do they know?! It's snowing outside!"
- 5. "The flu vaccine is only 51% effective at preventing the flu, so it's basically worthless."
- 6. "Republicans and Democrats are both wrong about some things; so, the best political view to have is an even compromise between both sides."
- 7. Only talking to other people that share your views contributes to what bias?
- 8. Racist and sexist views are often started or exacerbated by what fallacies and/or biases?
- 9. Many superstitions are formed by what fallacies and/or biases?
- 10. Be prepared to discuss the following claim as a class: "Wikipedia is a good resource."