CSC290 Communication Skills for Computer Scientists

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Lecture 2; Septermber 16, 2019

Critical Review

- We will skim/read the papers during this week's tutorial
- Required reading:
  - Transition to University
  - Grammar Hit Parade
  - How to read a paper **(read before your tutorial)**
- Start a draft as soon as you can
  - Your first draft will suck, that's okay!
  - You will think of ideas as you start writing.
  - Revise, revise, revise!

Critical Review Dropins

Drop-ins available at the RGASC

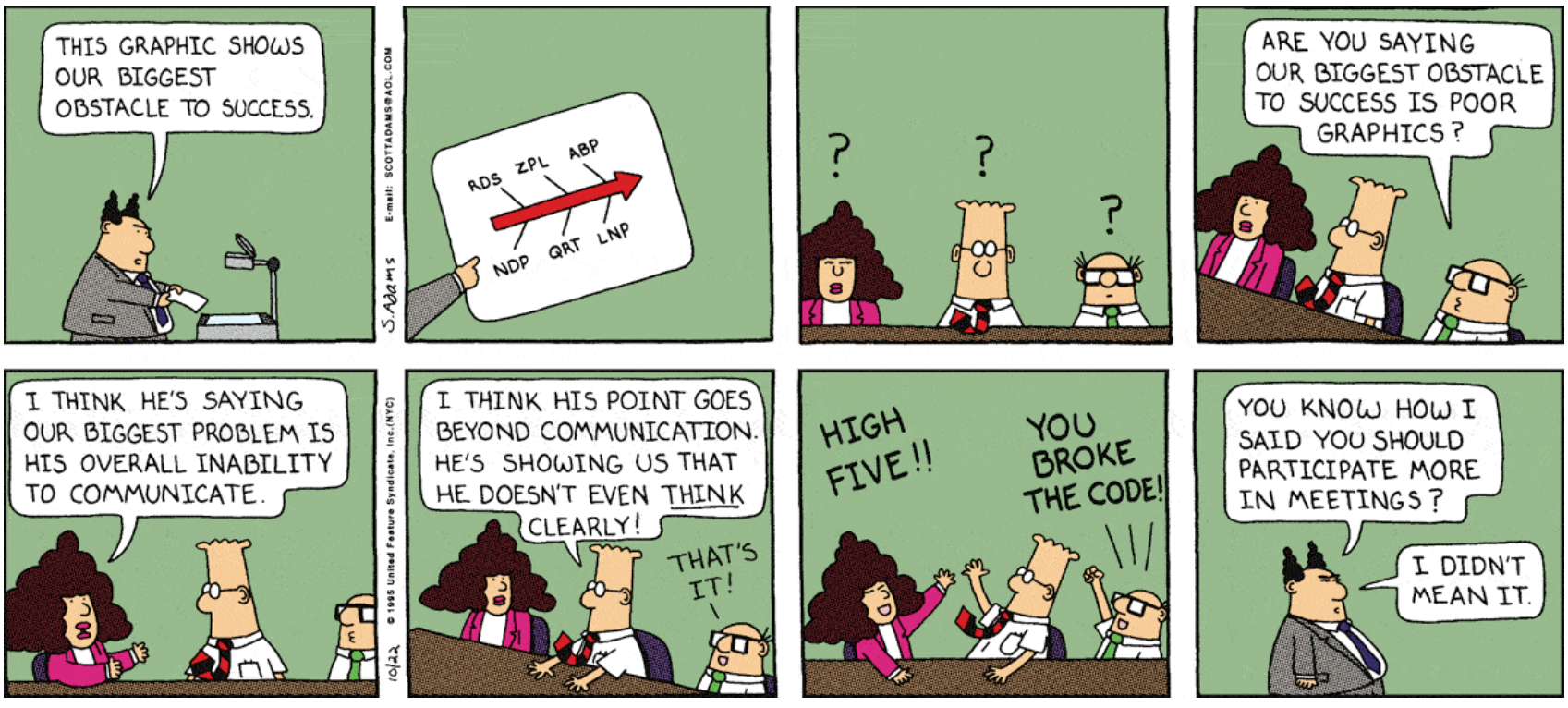
- October 3rd, 1pm-4pm, North Building 3rd floor

Questions?

Critical Thinking

Why Critical Thinking in a Communications Skills Course?

Clear thinking is the first step to clear communication.



Writing is Thinking

> *. . . writing—that first leap into taking your idea and making it a Thing People Read—isn't really about wording. It's about thinking. . .*

From https://alistapart.com/article/writing-is-thinking/

Critical Thinking

> *An intellectual discipline for examining information and determining validity – Dr. Richard Paul*

Focus in this course:

- Recognizing fallacies in reasoning
- Recognizing bias in self and others
- Recognizing when information is unclear (later lecture)

Today's Lecture

- Identify the difference between conceptual & empirical arguments
- Recognize common fallacies in conceptual & empirical arguments
- Organized arguments and ideas into coherent paragraphs
- Recognize bias in the way information is presented

Conceptual Arguments

Conceptual arguments do not rely on scientific/statistical data.

For example, if you think software piracy is wrong because you think stealing is wrong, you might argue that software piracy is a form of stealing. You don't use scientific data or statistics to make this point; you would have to write about the meaning of 'steal' and explain how you can steal software.

Empirical Arguments

Empirical arguments rely on scientific data.

For example, if you think software piracy is harmless because people only pirate software they wouldn't buy, you would need to find a reputable study showing that software pirates only pirate software they wouldn't buy.

Conceptual or Empirical?

Write "C" or "E" next to each of the following:

- We interviewed 10 business professionals, and 8 of them agreed that we should continue to teach cursive in elementary school.
- Everyone should learn programming, because learning programming teaches a person to think logically.
- A basic education is more important than fancy degrees that only 11% of people uses. If we have to cut education funding, it should be university funding.

Fallacy

A **fallacy** is. . .

- a mistaken belief, especially one based on *unsound* argument
- a failure in reasoning that renders an argument invalid
- faulty reasoning; misleading or unsound argument

In short, fallacies are “bugs” in arguments.

Fallacies in Conceptual Arguments

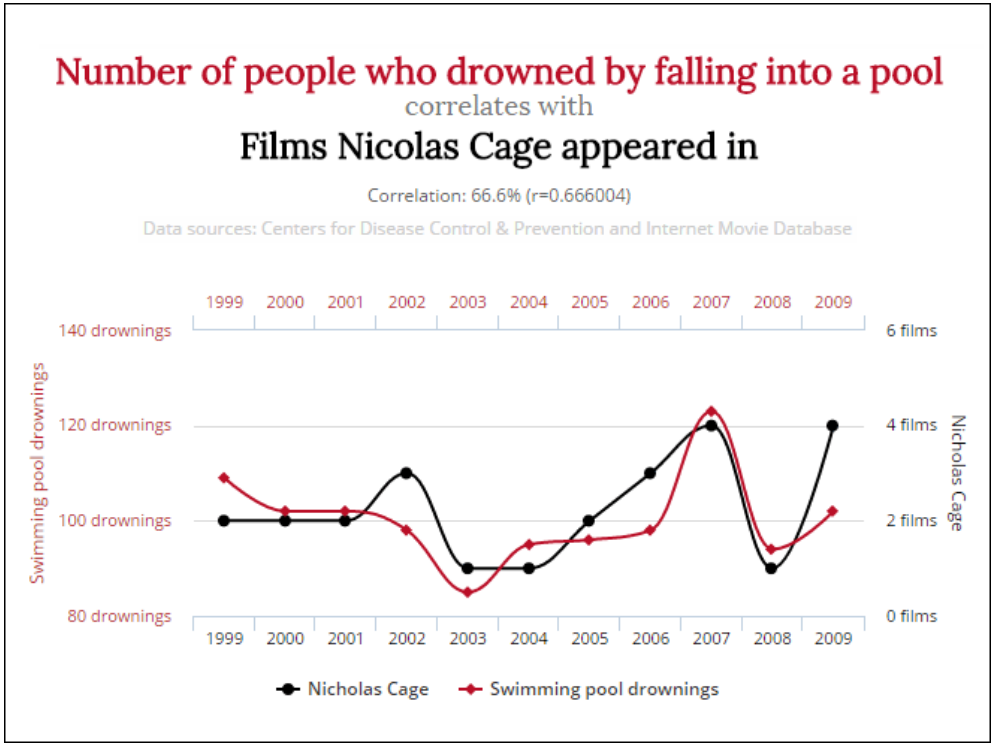
- **Ad hominem**: argument that attacks attributes of the person making the argument.
- **Vested interest fallacies**: dismissing an argument on the ground that the person making the argument stands to gain from the argument being accepted.
- **Straw man fallacies**: deliberately confuse an argument with a weaker argument.
- **False dilemma**: mistaken belief that there are only N options.
- **Black swan fallacy**: I haven't seen a black swan, therefore it doesn't exist.
- **Inappropriate appeal to authority**: Appealing to an authority in a different field.
- **False Analogy**: An argument by analogy in which the analogy is poorly suited.

Worksheet

Fallacies in Empirical Arguments

- **Correlation vs causation**: correlation does not imply causation! If A and B are correlated, then we can have:
  - A cause B
  - B cause A
  - A, B have a common cause C (called a **confounder** or **confounding factor**)
- **Low sample size**: sample size too small with respect to the group that you want to make a claim about.
- **Biased sample**: sample is not representative of the group that you want to make a claim about.
- **Out-of-date**: study is conducted too far in the past, and factors influencing the claim has changed since then.
- **Leading question**: the study question encourages a certain response from the participants.
- **Survivorship bias**: The sample studied only contain "survivors".
- **p-hacking**: Looking through lots of data to try and find spurious *correlations*.

Fallacies in empirical arguments - p-hack



p-hacking: Looking through lots of data to try and find spurious *correlations*.

spurious correlations: Two variables appear correlated, but only due to random chance.

Fallacies in empirical arguments - Survivorship

- In WW2, workers examined the distribution of damage in returned aircraft and tried to build more resilient aircraft by reinforcing areas with more damage.

A statistician named *Abraham Wald* made the assumption that damage *should* be uniform.

- Aircraft damaged in vulnerable parts never made it back.
- Therefore, reinforce areas in returned aircraft with *less* damage!

Survivorship bias: Does your sample only contain "survivors"?

Worksheet: Analyzing Arguments (Critical Review)

Individually: read and summarize the author's argument (3 min)

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We will organize these into paragraphs to give it structure

Example: Reasons why dogs are great (ideas)

- dog are always happy to see you
- dogs are fun
- dogs are useful
- dogs are great animals
- dogs can be used to track people
- dogs can play fetch
- dogs can catch drug smugglers

Example: Reasons why dogs are great (structured)

- dogs are great animals
  - dogs are fun
    - dog are always happy to see you
    - dogs can play fetch
  - dogs are useful
    - dogs can be used to track people
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Worksheet Continued: Critical Review

Organize your ideas to give it structure.

Grammar Break

Word Choice

Choose the correct word to fill in the blank:

- Submit all assignments on MarkUs (except / accept) the critical review articles.
- Have you completed (your / you're) blog post?
- Do not be (dependent / dependant) on software testers to test your code.
- Calculus 1 is a course that (precedes / proceeds) Calculus 2.
- The amount of sleep you get (affects / effects) your code quality.
- We completed the development. (Further / Farther), we thoroughly tested the code.
- The documentation (complements / compliments) the code.
- The code is well written. (Its / It's) docstrings are clear and succinct.
- Your code should be documented, (e.g. / i.e.) each function should have a docstring.

Bias

Which is true?

Canada: A Dangerous Place to Live. Despite the best efforts of police departments across the country, the number of murders committed in Canada has increased 6% since 1996.

Canada: A Safe Place to Live. The Canadian gun registry appears to have paid off. The Canadian murder rate has decreased by 4% since 1996, about the time short barrelled handgun registration started.

Which is true?

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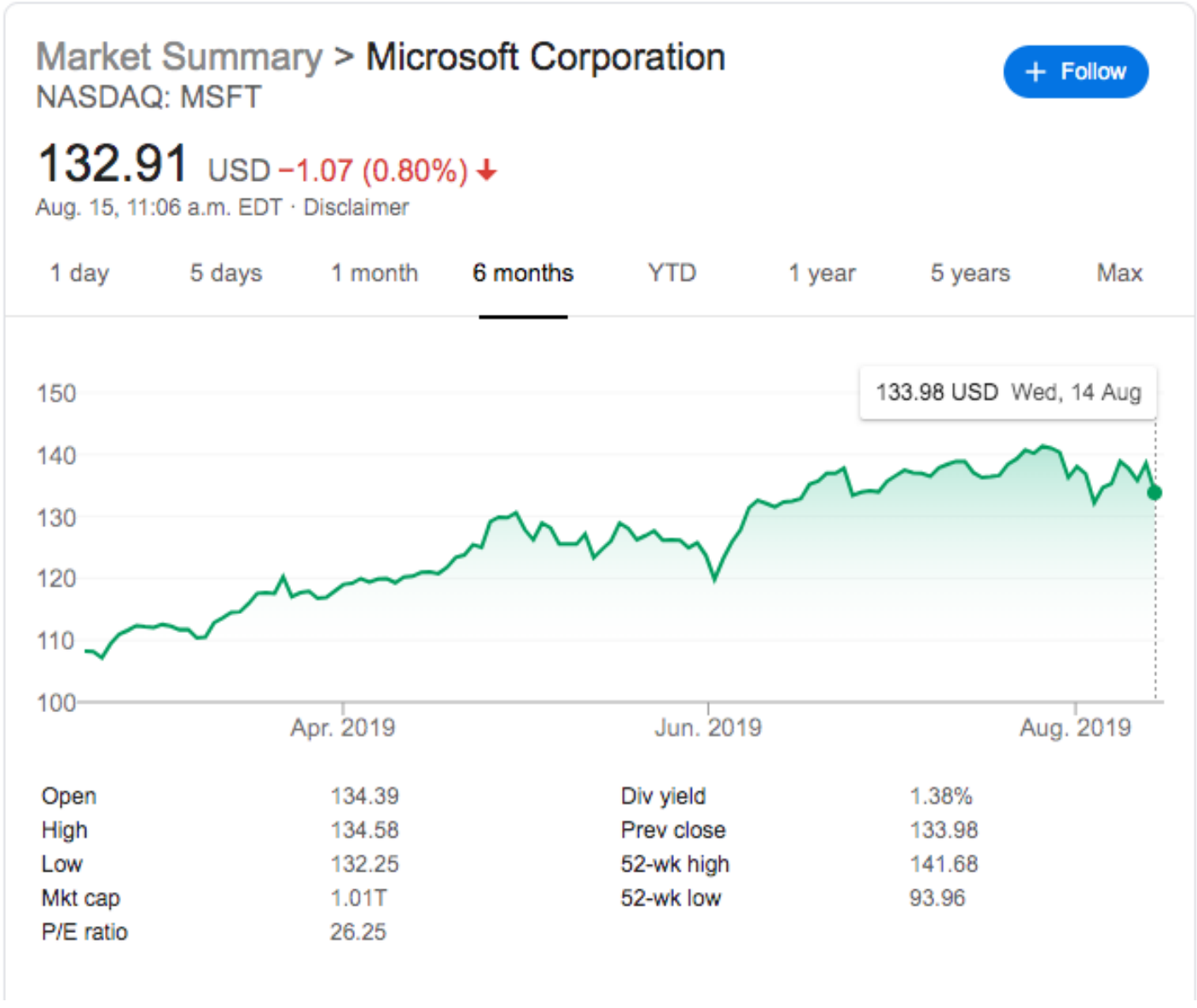
Canada: A Safe Place to Live. The Canadian gun registry appears to have paid off. The Canadian murder rate has decreased by 4% since 1996, about the time short barrelled handgun registration started.

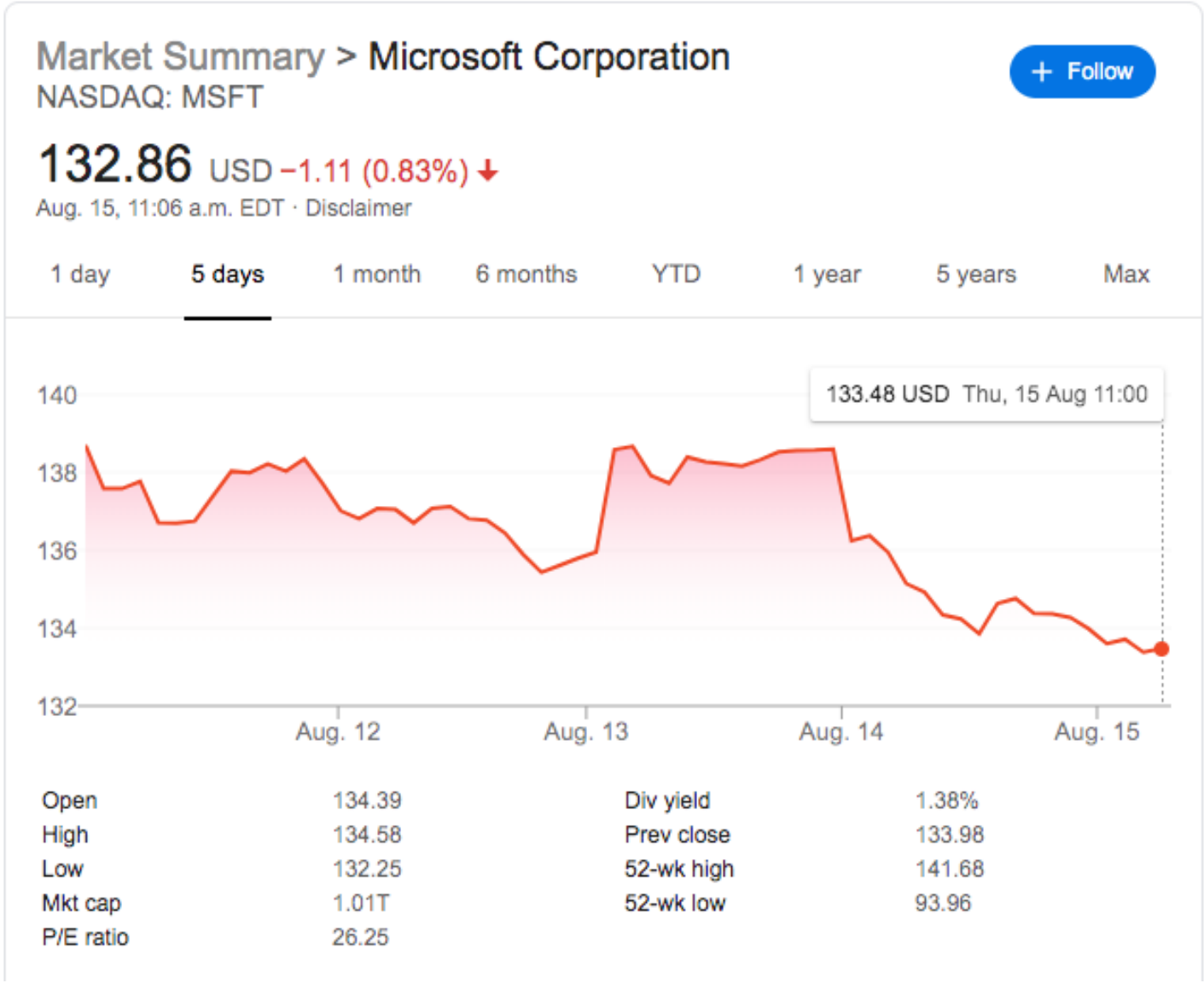
Both can be true!

You can paint different pictures depending on how you summary and present your data.

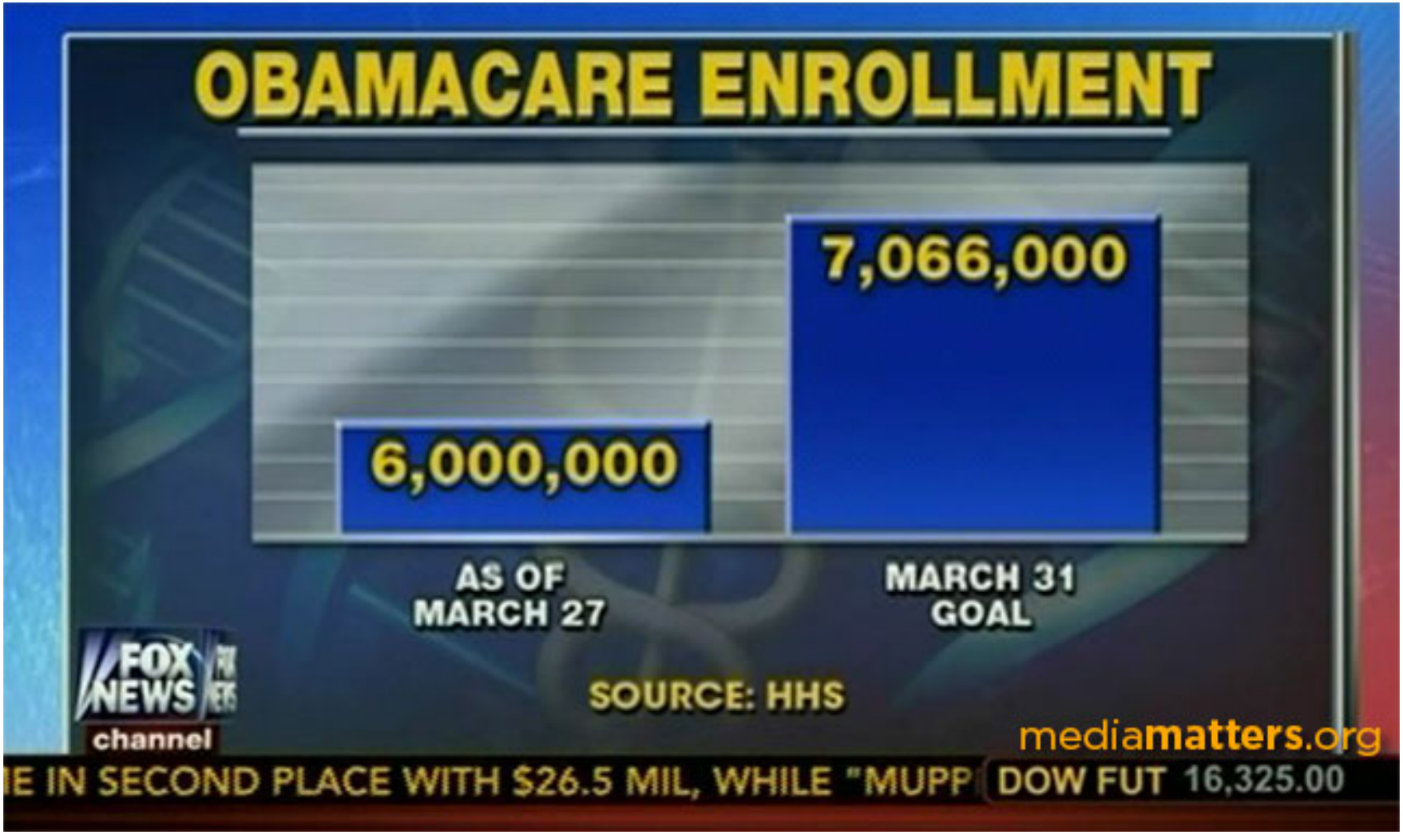
Is Microsoft stock trending **up** or **down**?



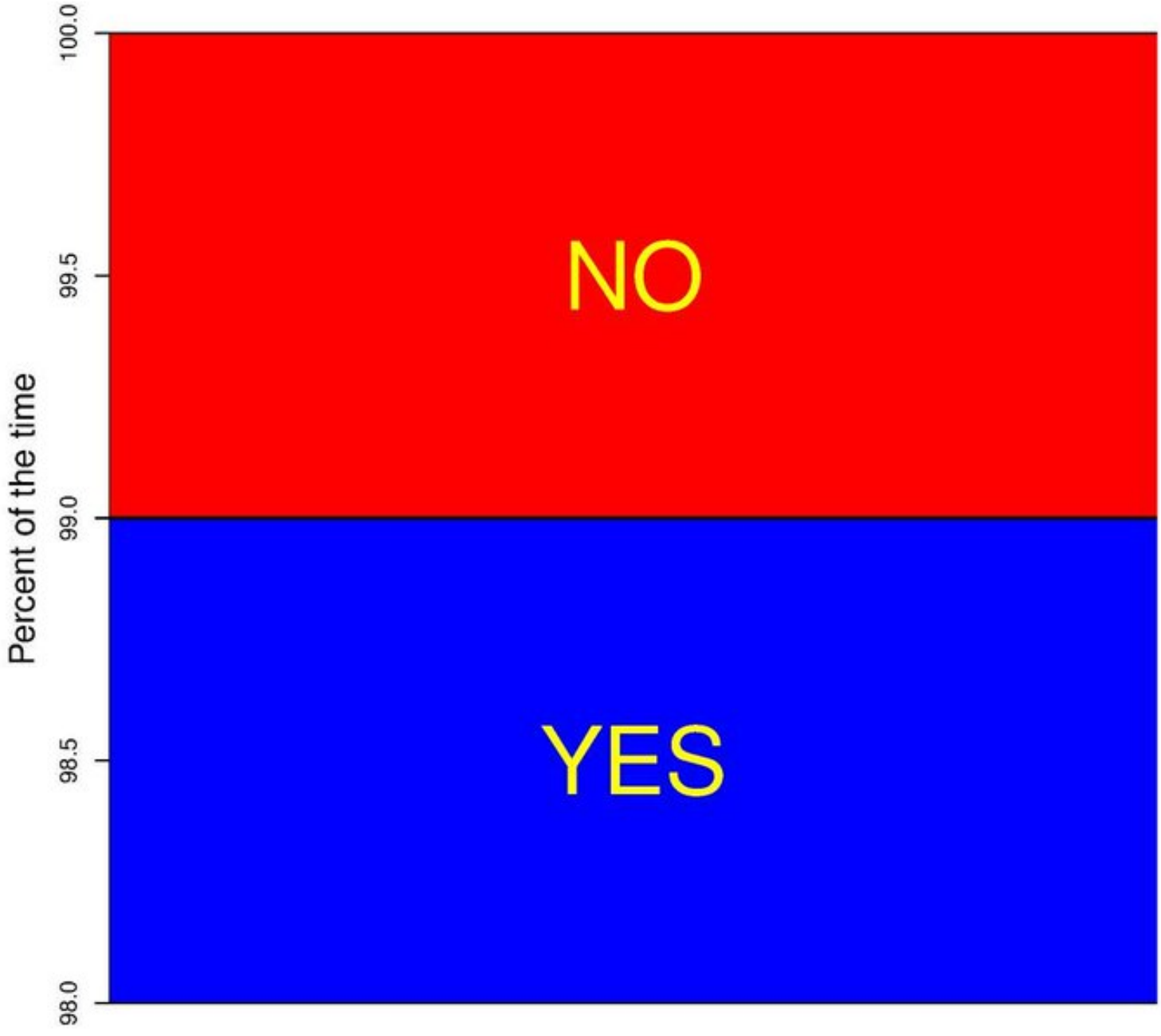
What about now?



What is wrong with this chart?

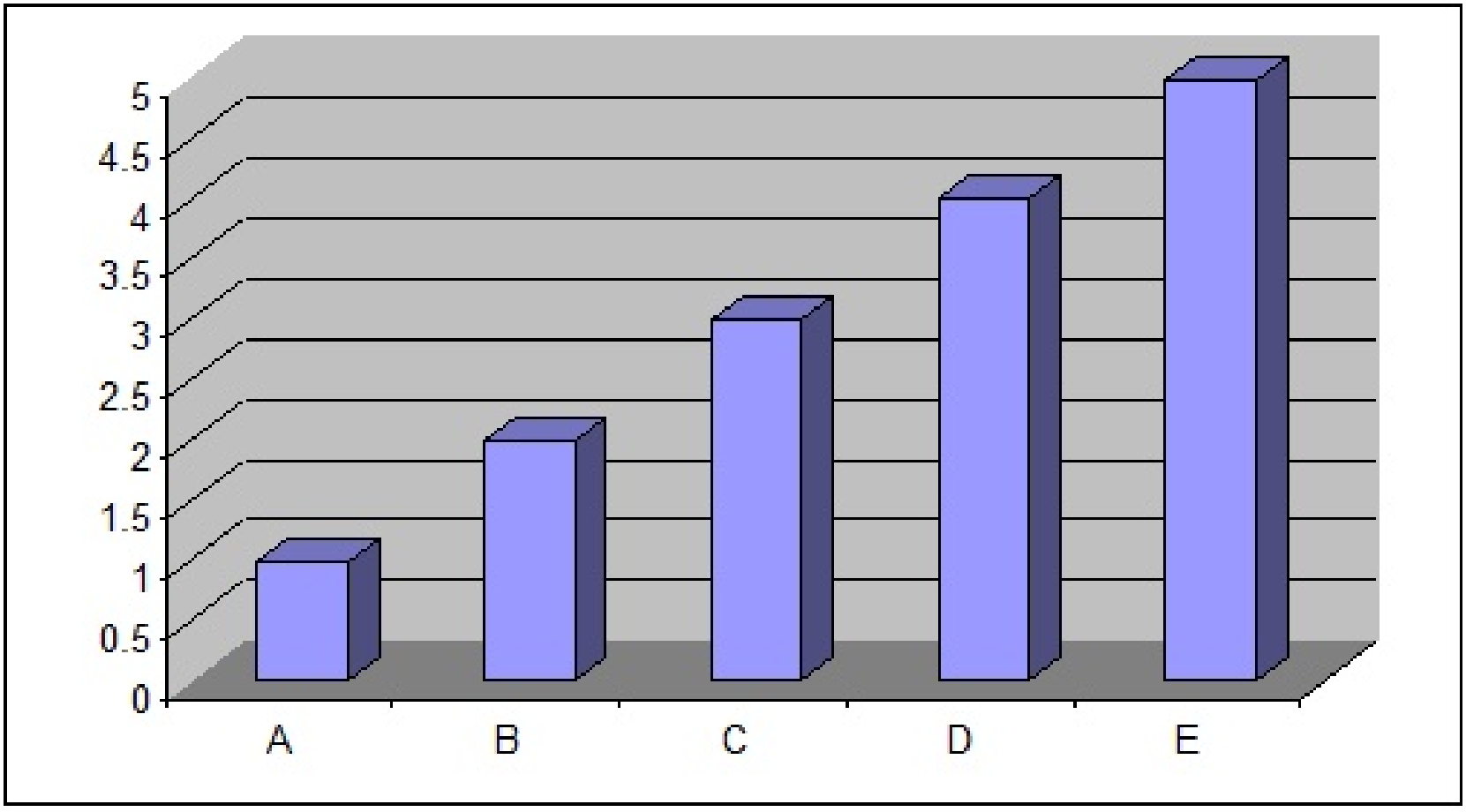


Is truncating the Y−axis misleading?

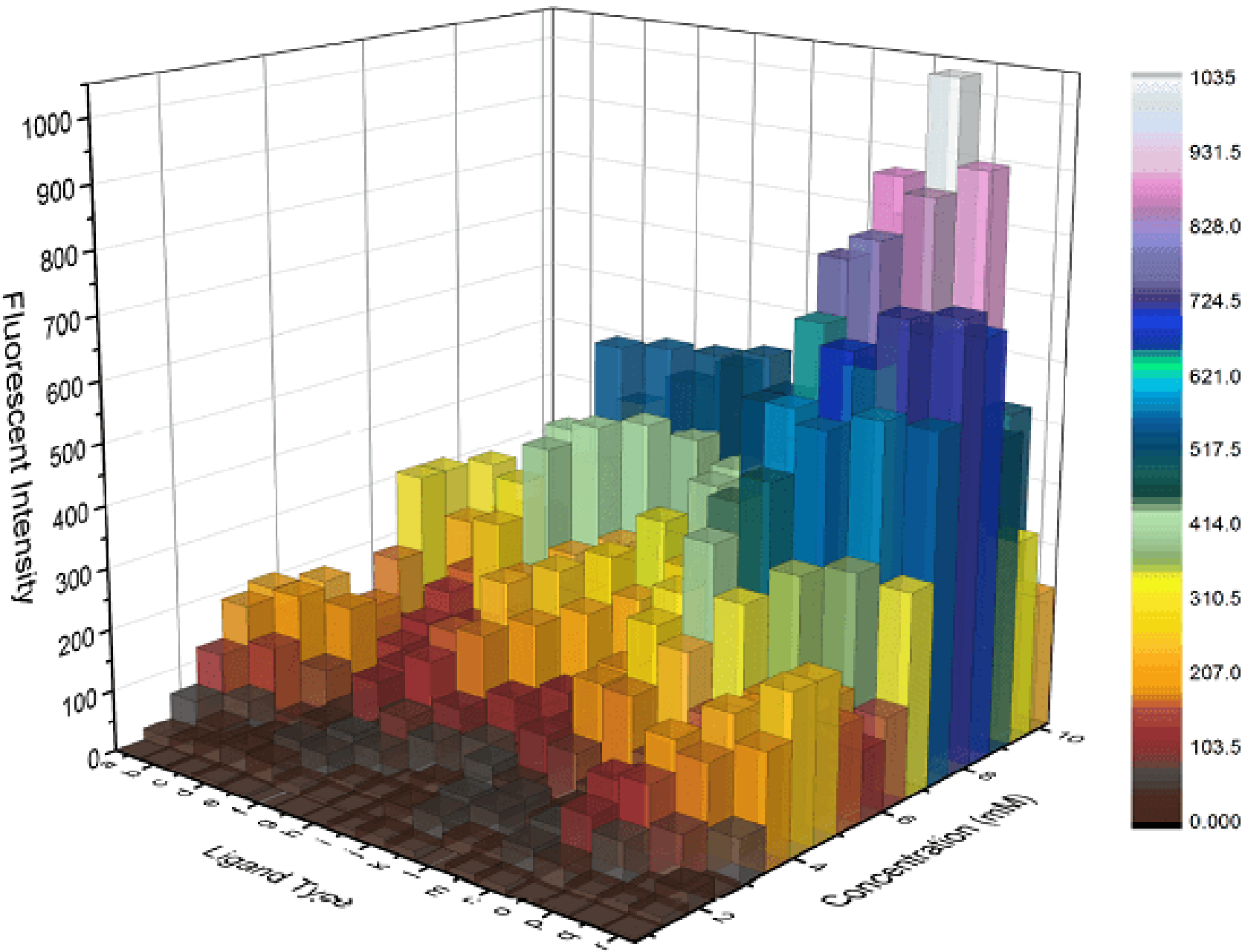


Corrected visualization

What is the value of “A” here?



Unreadable Visualizations



Sample Past Multiple Choice Questions

Question 1

The department surveys 100 calculus students at the end of the term, and asks "Is this course too hard?" This questions is leading. A better question would be:

- Is this course very difficult?
- Would you consider this course to be very easy?
- Is this course much easier than other courses?
- How would you rate is this course in terms of difficulty?
- What made this course difficult?

Question 2

A CS student concludes that learning the programming language Racket is useless because he has never seen professional programmers use Racket. This is an example of:

- A leading question.
- Inappropriate analogy.
- Inappropriate appeal to authority.
- All of the above.
- None of the above.

Question 3

Out of the 10 university students the company interviewed for an internship position, none of them had strong communication skills. Which of the following claims does **not** follow?

- Universities should do a better job teaching communication skills.
- The company should offer a communications workshop to current employees.
- The company should look for candidates elsewhere.
- Candidates for this internship position should opt to take communication workshops.

Question 4

At the University of Toronto, course evaluations are used to determine the quality of courses and professors. Why do course evaluations suffer from survivorship bias?

- Students who dropped the course do not complete the evaluations.
- Students may retaliate against professors if they receive a poor grade.
- Students only rate professors who are still teaching the course.
- Every student will perceive the course a little differently.
- Students have already “survived" the course, so they won’t care anymore.

Question 5

Which of the following is an example of using an unrepresentative sample?

- Sampling 1% of UTM students to complete a survey about UTM student stress.
- Sampling 2% of UTM students to complete a survey about UTM student stress.
- Sampling 30% of UTM students to complete a survey about how adults perceive colour.
- Sampling 25% of UTM researchers to complete a survey about availability of funding at UTM.
- Both of the first two answers.