SE4831 Software Quality Assurance
When to Stop Testing

- Objectives
  - Express the ramifications of stopping testing too soon or continuing testing too long
  - Justify why it is appropriate to stop testing on a software development project
  - Compare and contrast calendar time and testing time
  - Using defect trends, determine if a given software package is ready for release
  - Define bug convergence
  - Explain the Zero Bug Bounce effect

- What does "done" mean?

Depends on who defines it!

Discussion

Simple: when advisor says it is done.

Test A, Agreed, accepted by client.

When to stop testing?

- "There is no, single valid, rational criterion for stopping. Furthermore, given any set of applicable criteria, how each is weighted depends very much upon the product, the environment, the culture and the attitude to risk." – Boris Beizer

Too early release

Too early release

- Many defects left in product, including show stoppers
  - Product might be manageable with a small number of customers and set expectations
- Tense environment may make it difficult to switch to new products
- Increased employee turnover potential
- Customer frustration

Too Late of a Release

Too Late of a Release

- Team members and users confident in quality of product
- Customer support needs small and predictable
- Potential loss of revenue, long term market share, and project cancelations, therefore increasing business risk
- Organization may gain a reputation for quality, leading to greater market share in the future
- Customer frustration

Answer #1: Never

Answer #2: When you run out of testing resources

Answer #3: When the desired coverage has been obtained

- Test until you have obtained the required coverage and then stop

- Problem with methodology

Does coverage == quality?

Answer #4: When promised to the customer

Cassini Problems

- Even scientists make mistakes.
- Huygens probe communicates to Cassini Spacecraft via radio.
- As probe and spacecraft separate they pick up speed (**V**) with respect to one another.

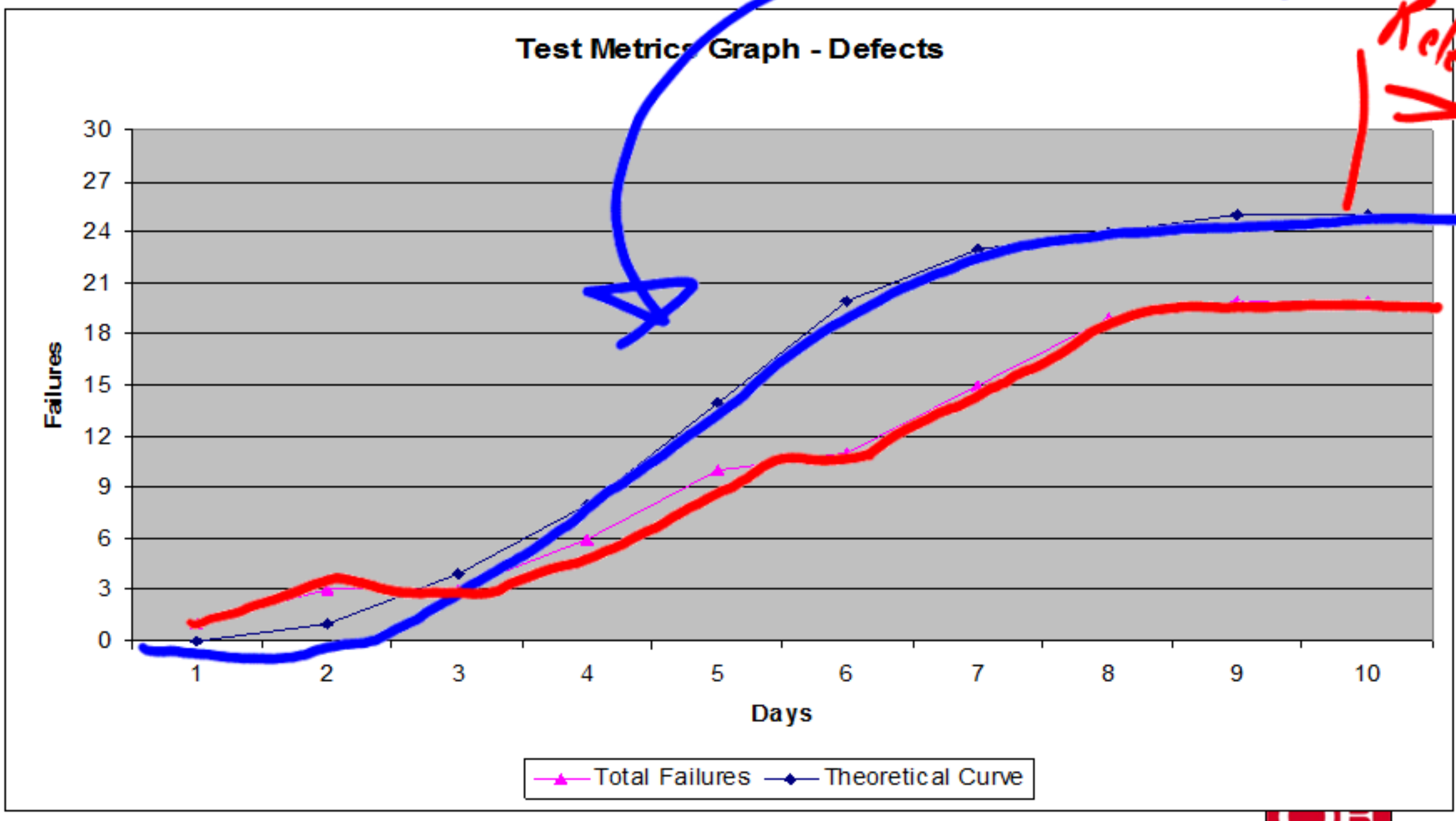
- Resulting $\Delta\lambda$ is too great for the Cassini radio receiver!

- By using defect trend data

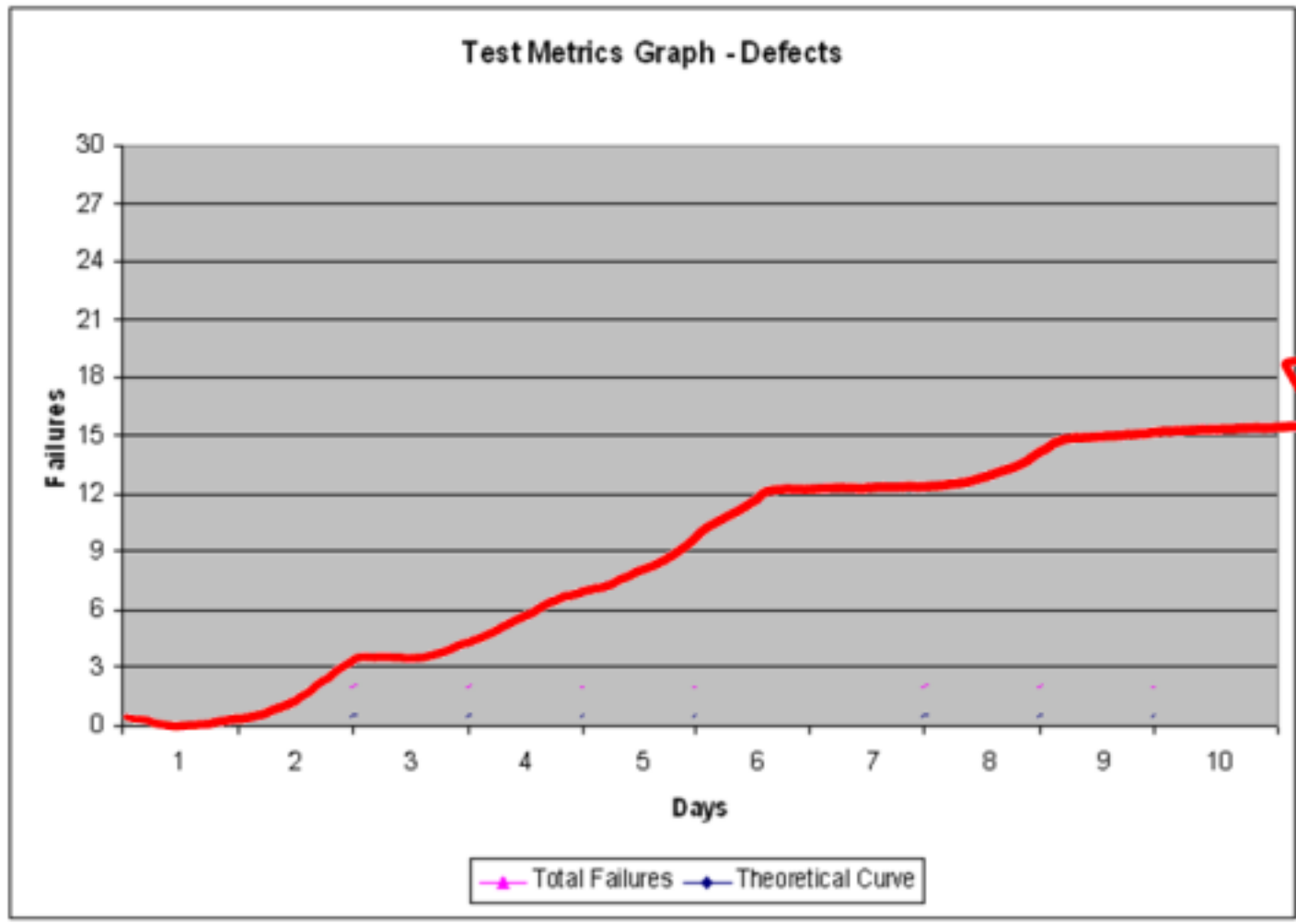
Answers #6, #7, #8, etc.

Bugs found
Fixed
Remaining
etc

Answer #5: When you stop finding defects

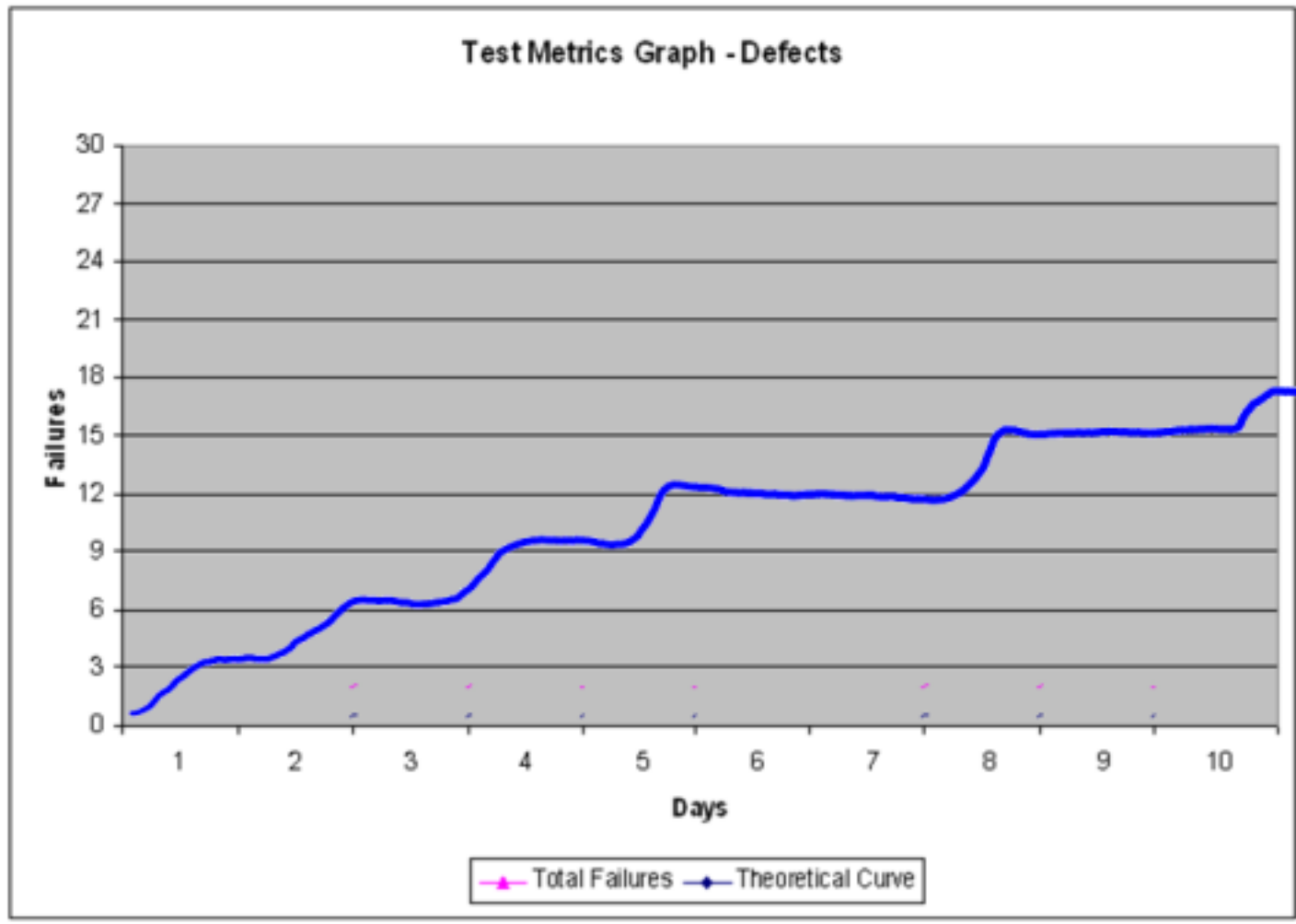


Is this ready for release?



Stable

Is this ready for release?



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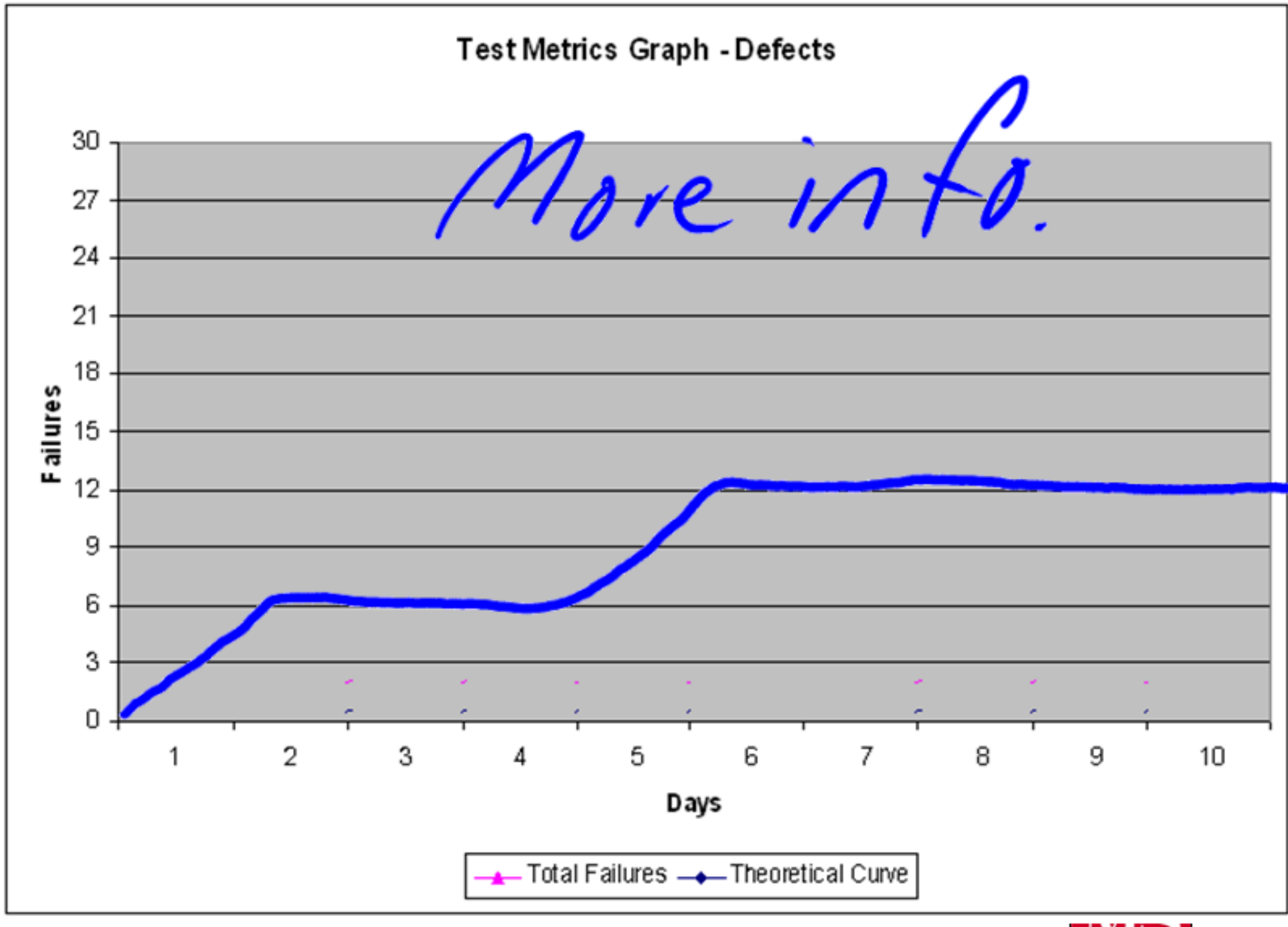


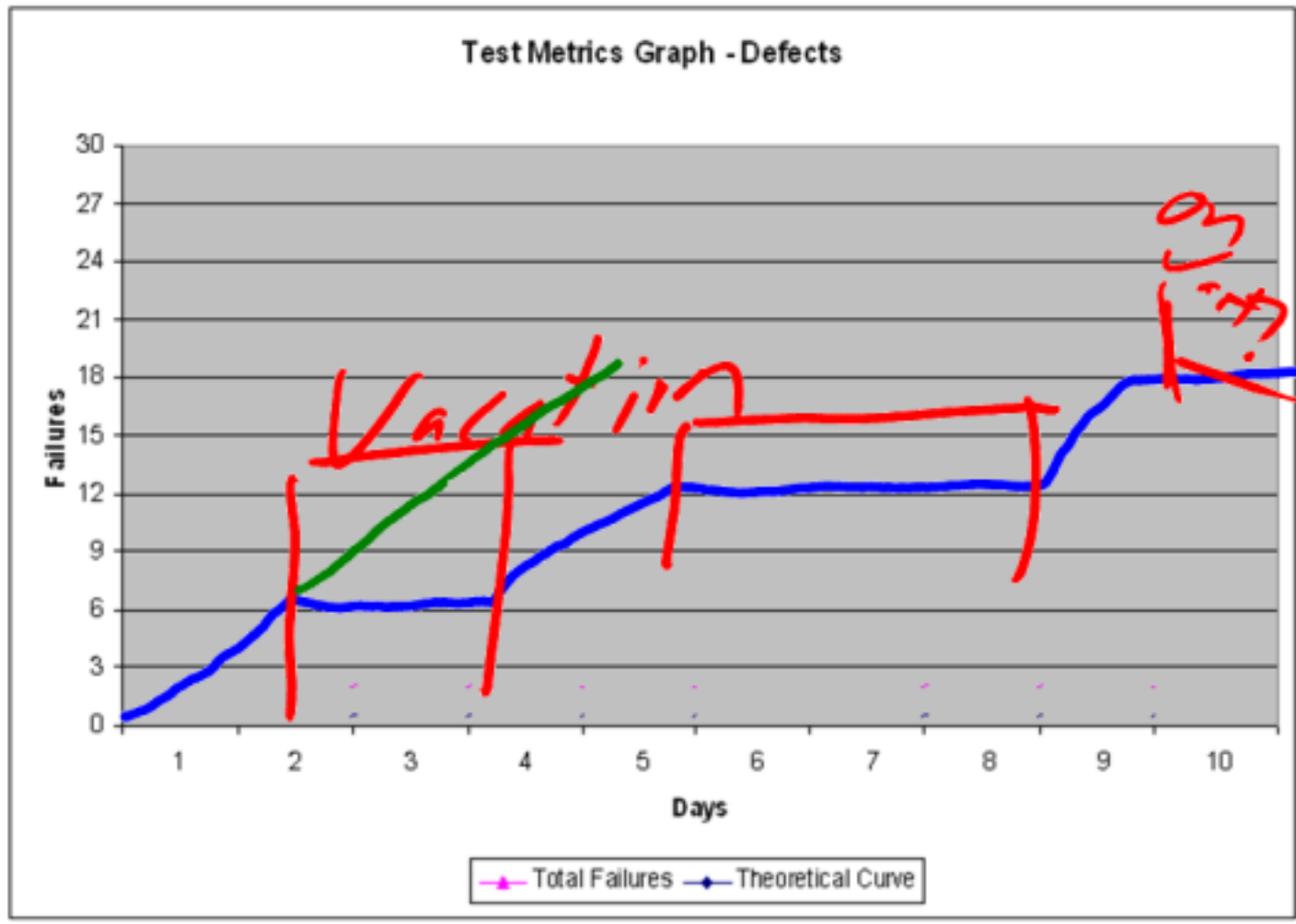
Assumptions

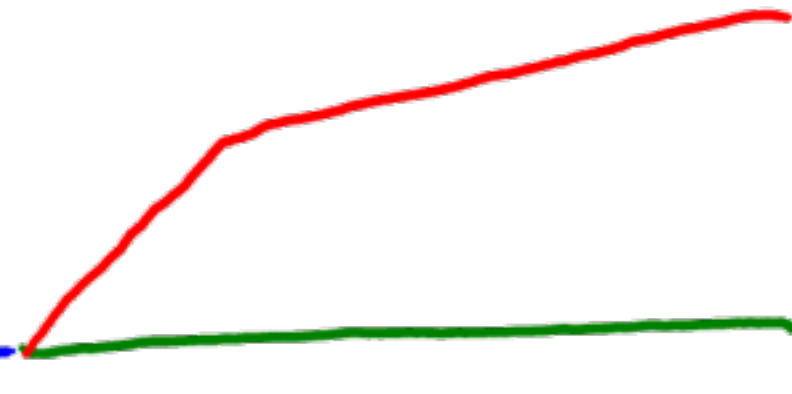
- Testing Time
- Calendar Time

Is this time spent executing program?

Time on the calendar.

Is this ready for release?



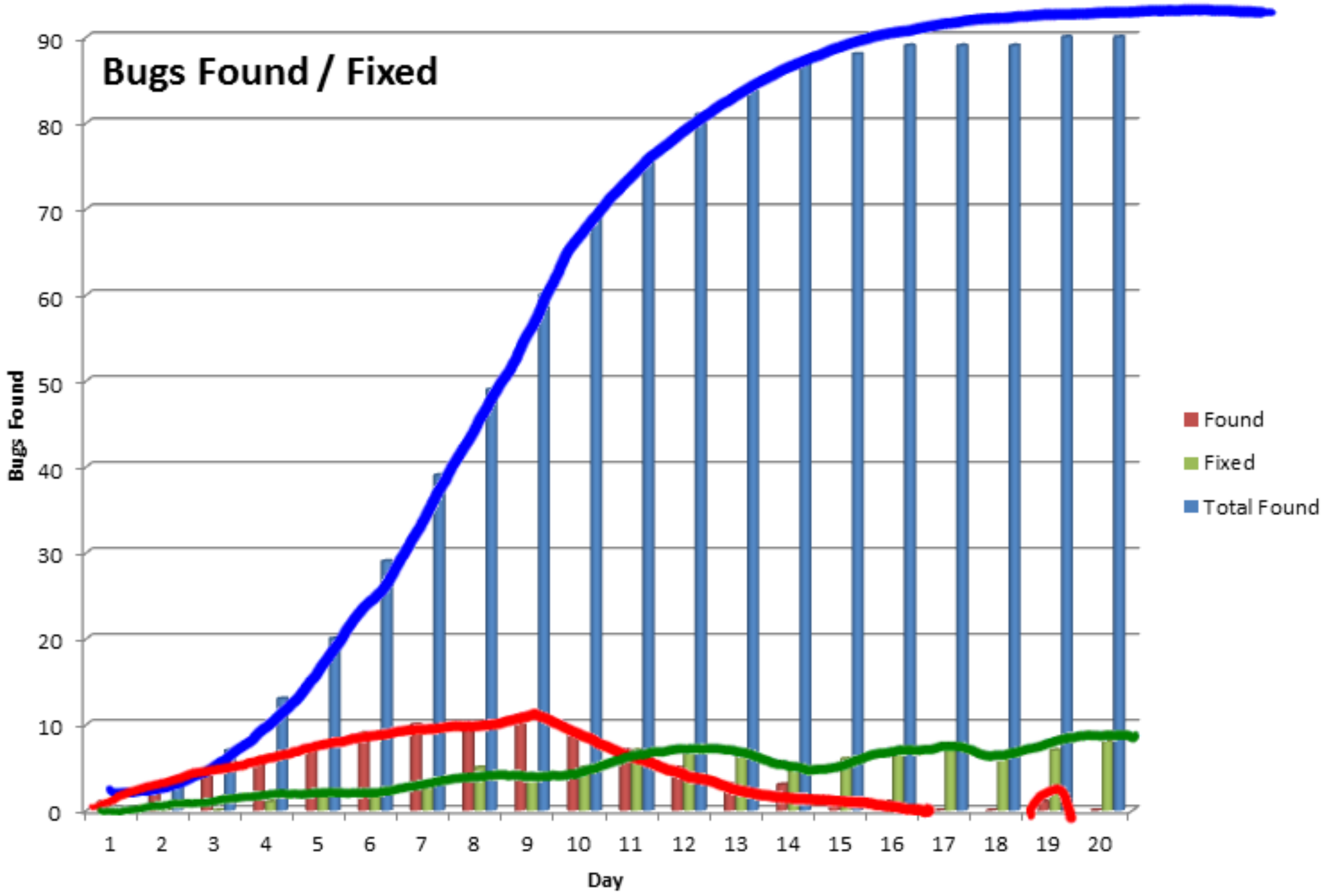


Answer #7 When the number of open defects approaches zero

- Zero Bug Bounce
  - Defect management technique made popular by Microsoft.
  - Also used extensively in Agile Processes

Found – Fixed

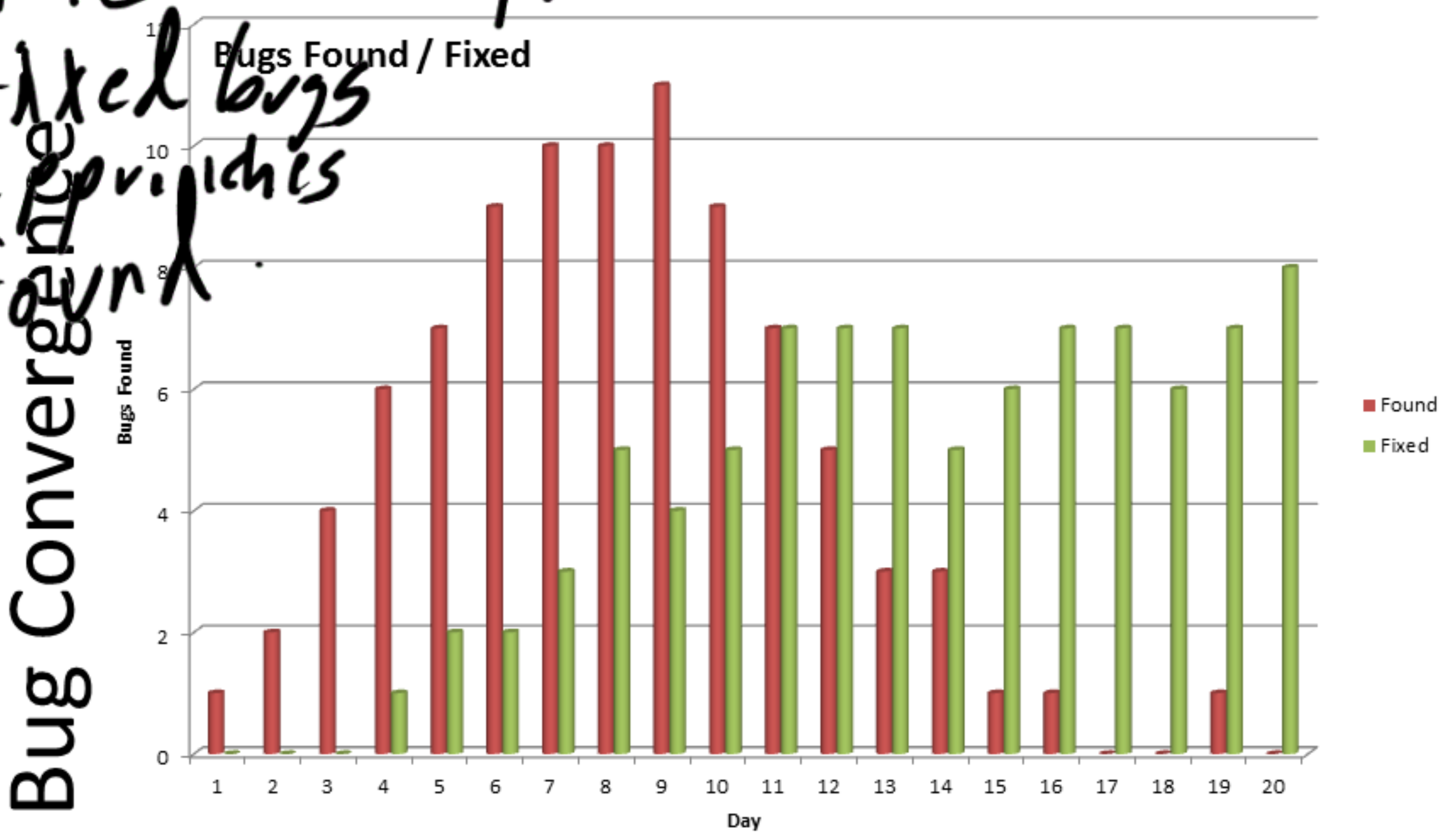
Bug Convergence



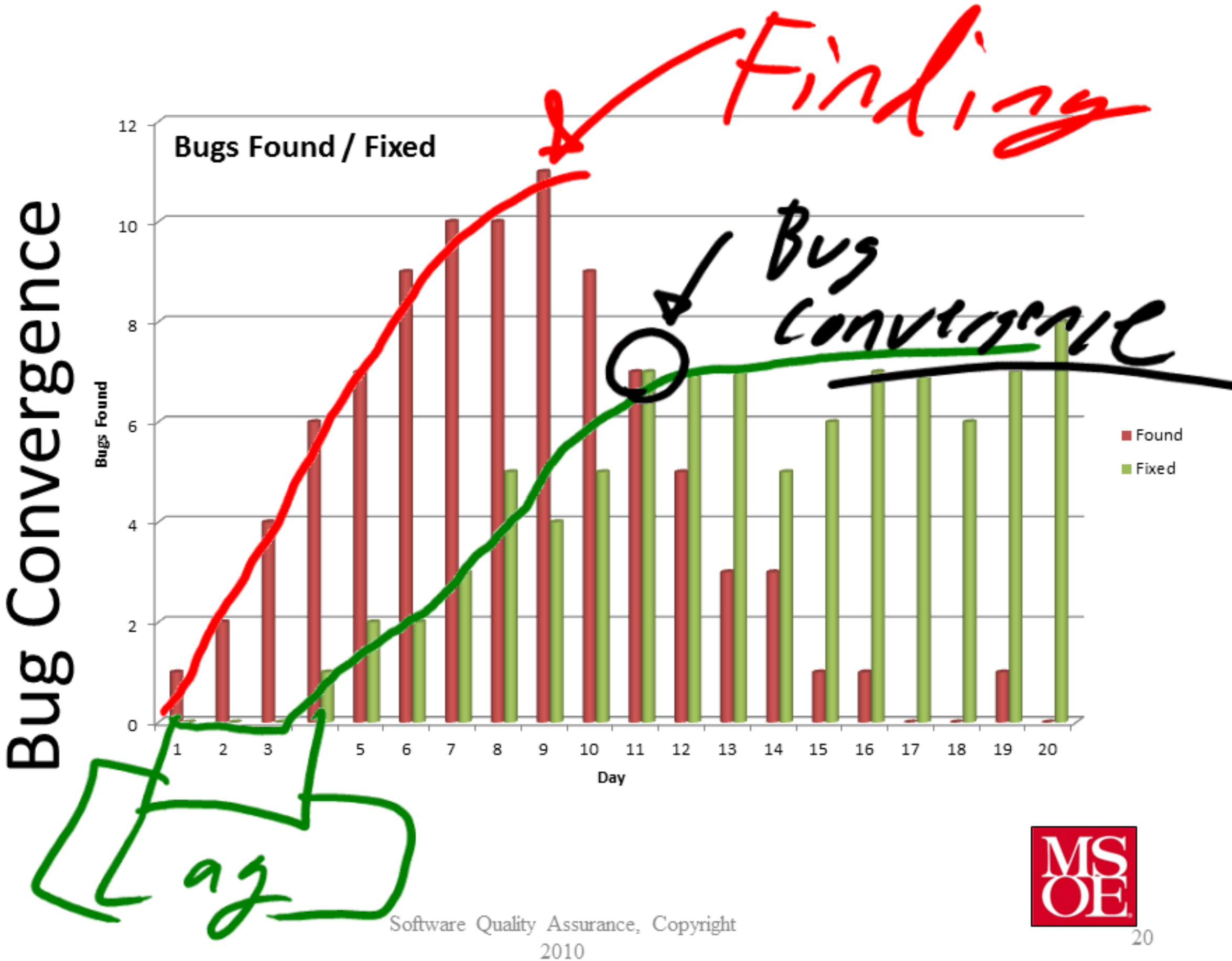
The first print where the Fixed bugs appears

Convergence

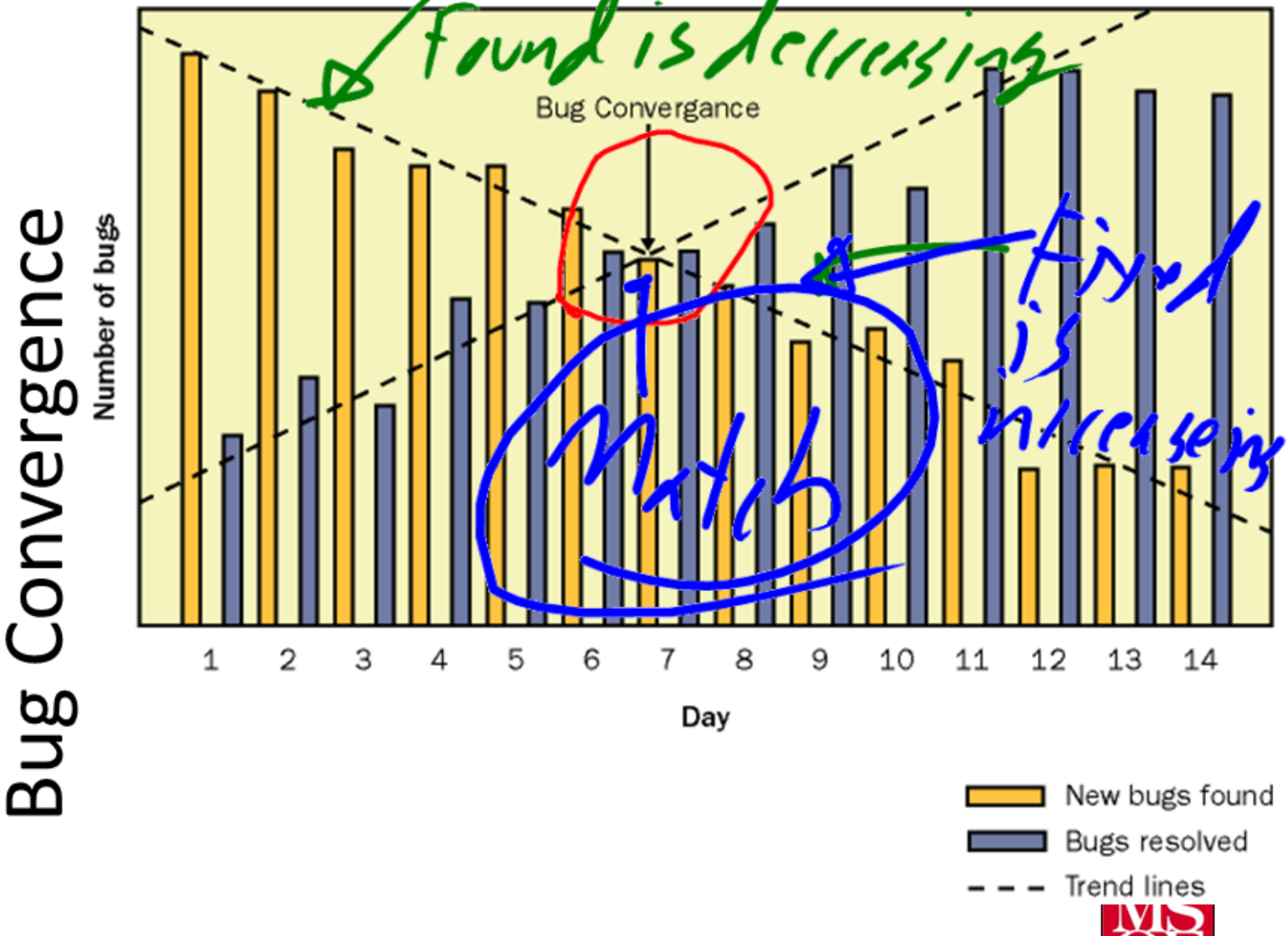
Bug Count



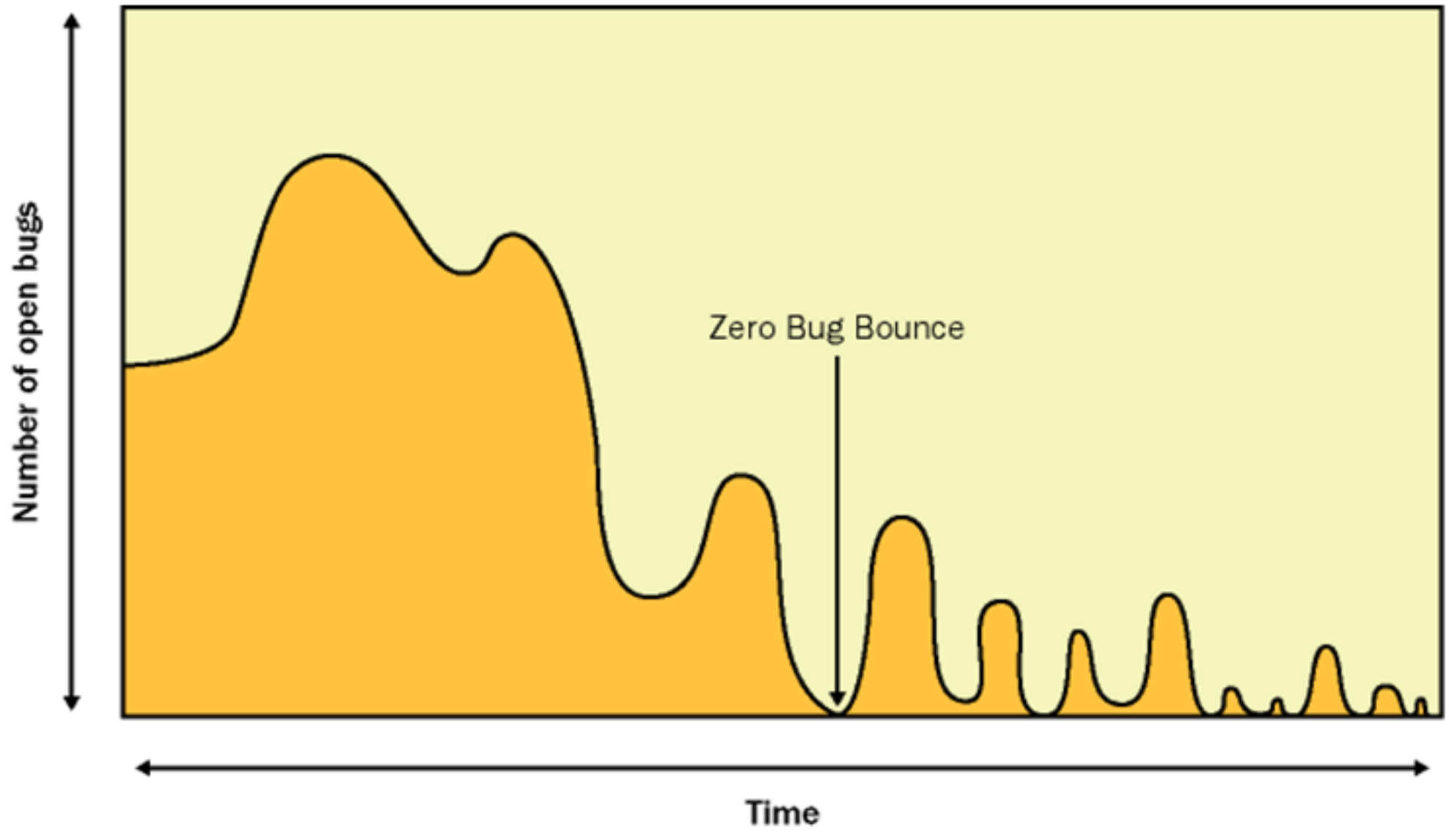
Bug Convergence



Bug Convergence

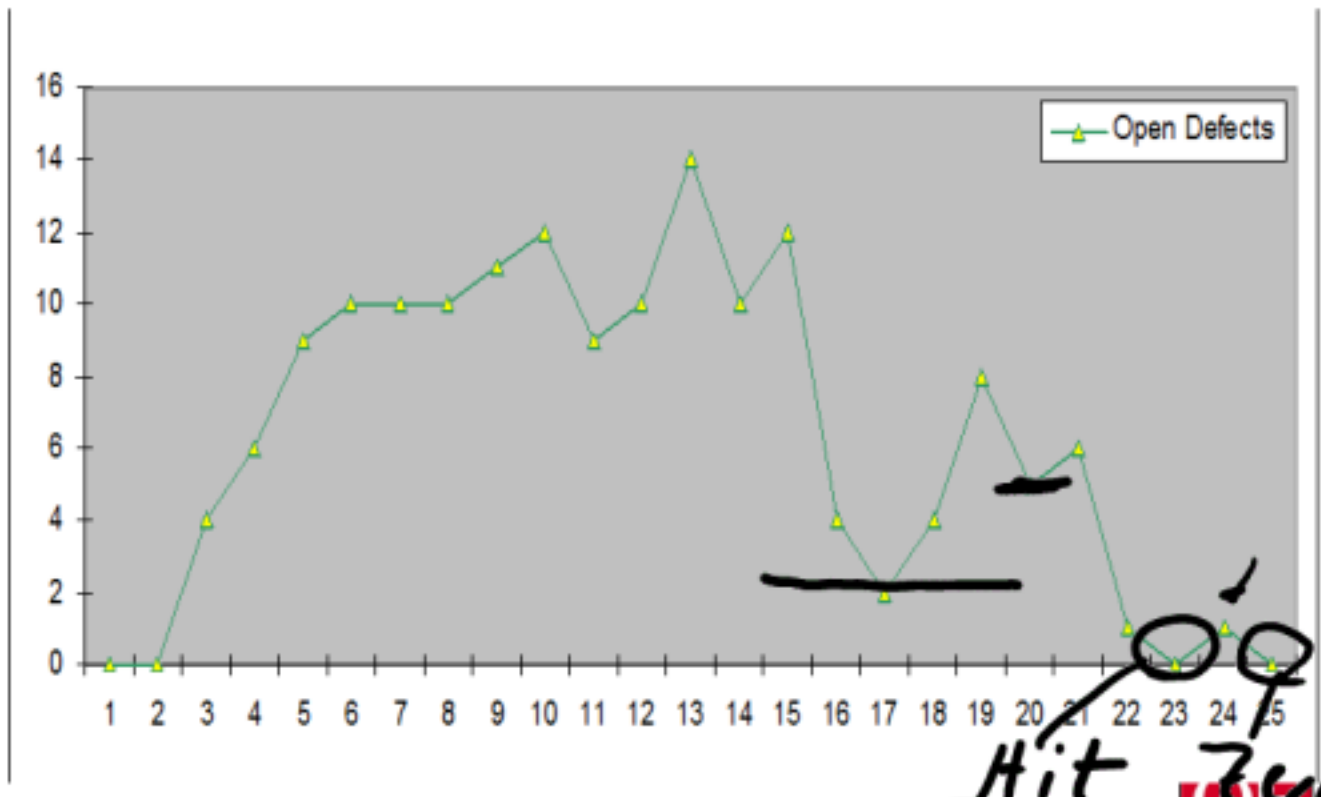


Zero Bug Bounce



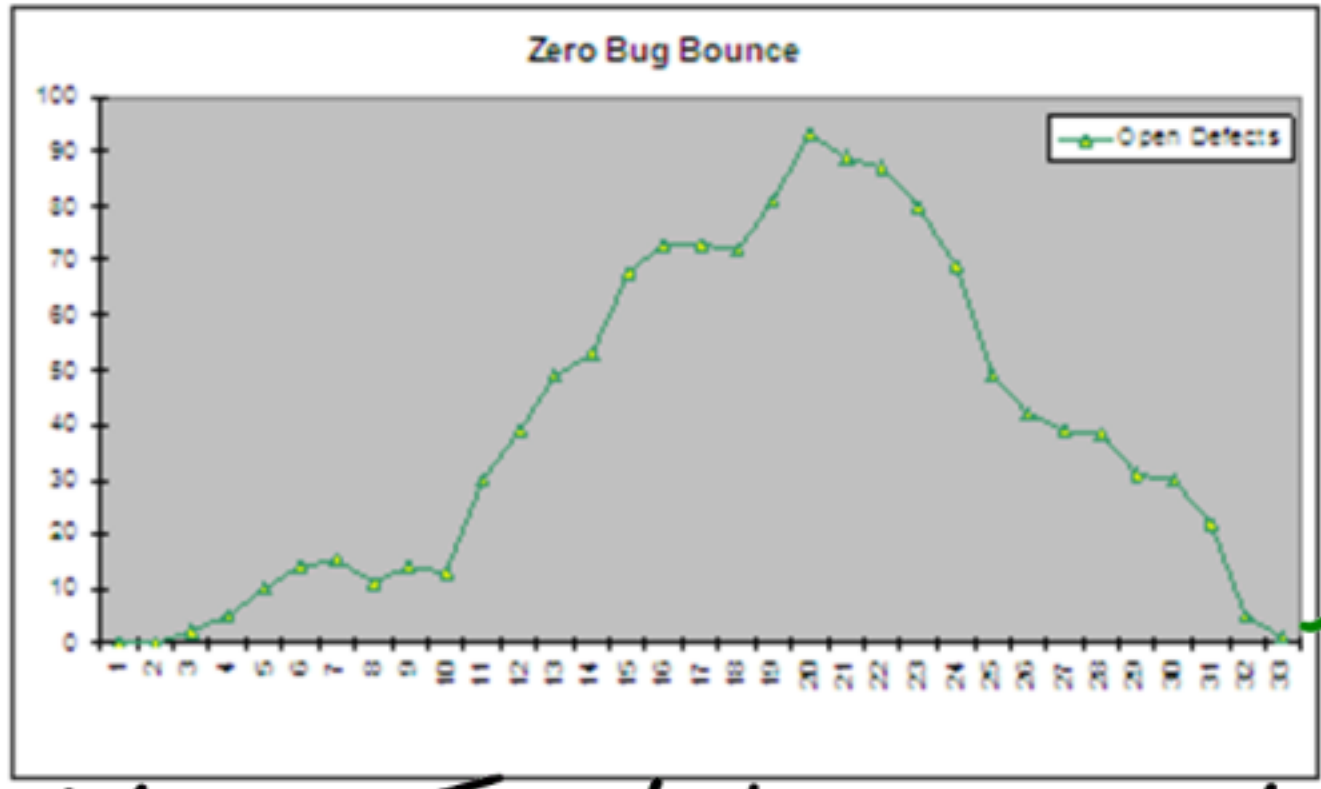
- Tracked by charting the number of Open defects at the end of each day.

Zero Bug Bounce



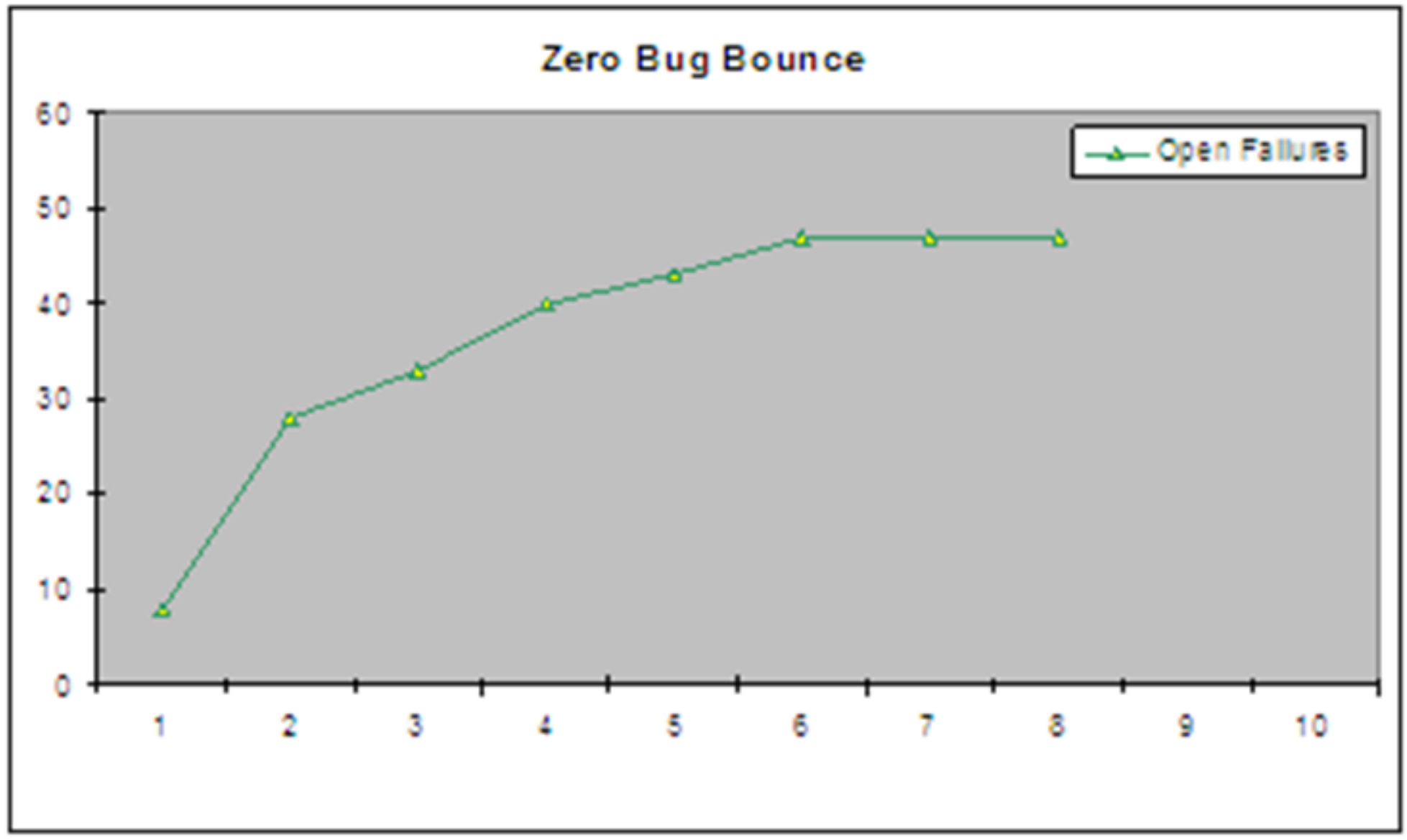
close, w/in a few days.

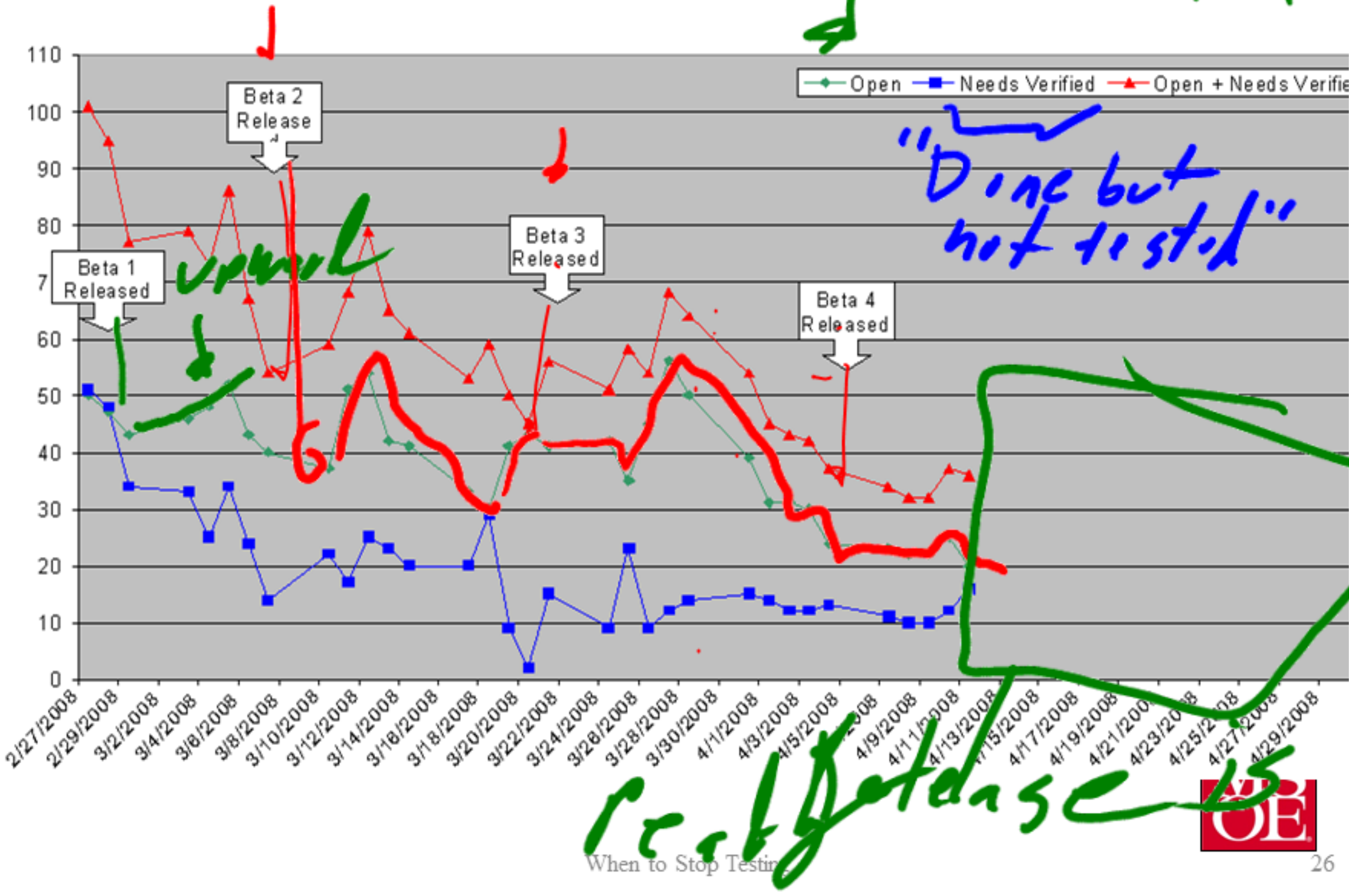
Ready for release?



No → Just hit zero/ for inflection point/ first time!

Zero bug bounce

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Open + Needs Verifie
Beta 1 Released
Beta 2 Release
Beta 3 Released
Beta 4 Released
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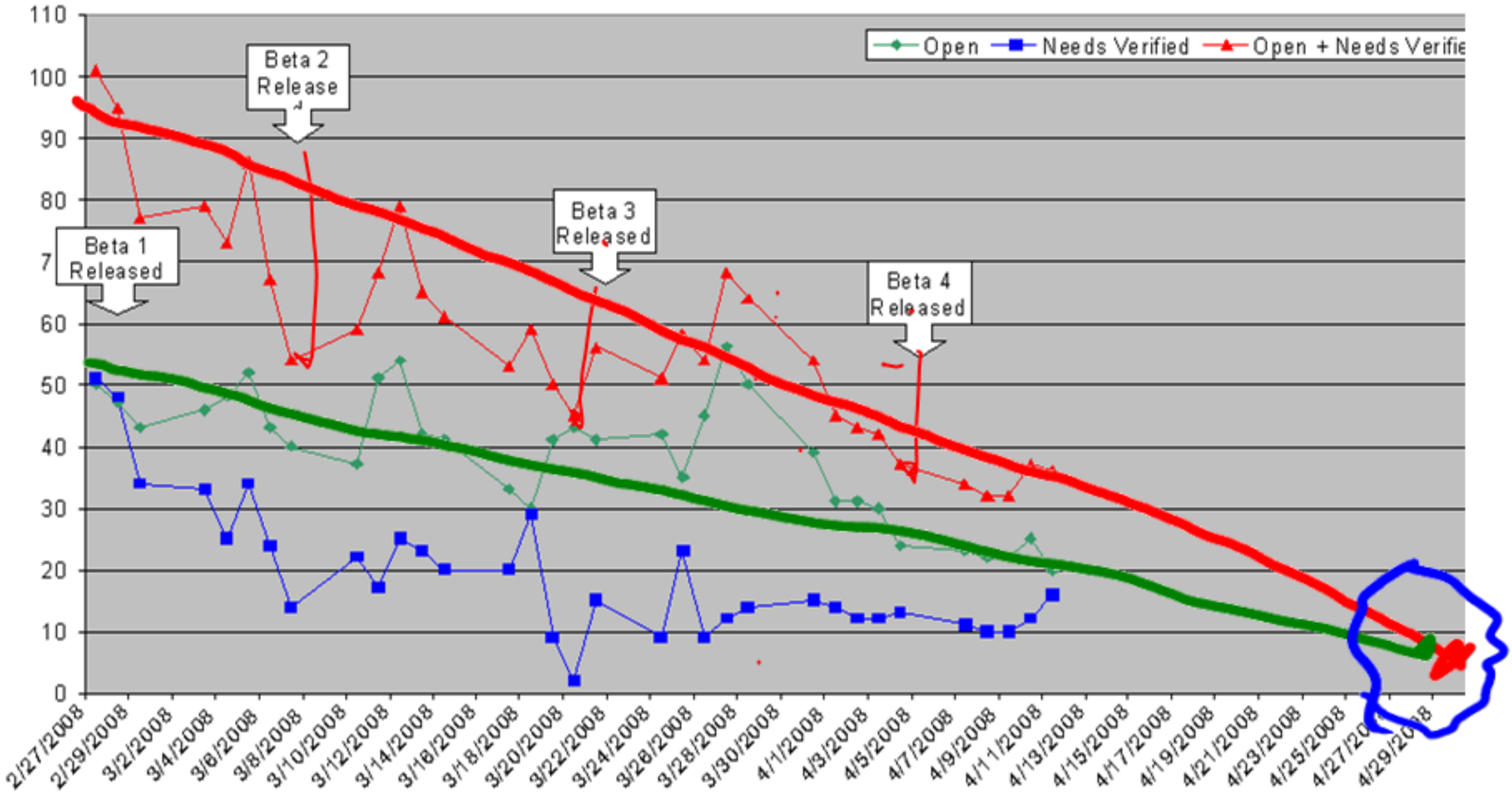
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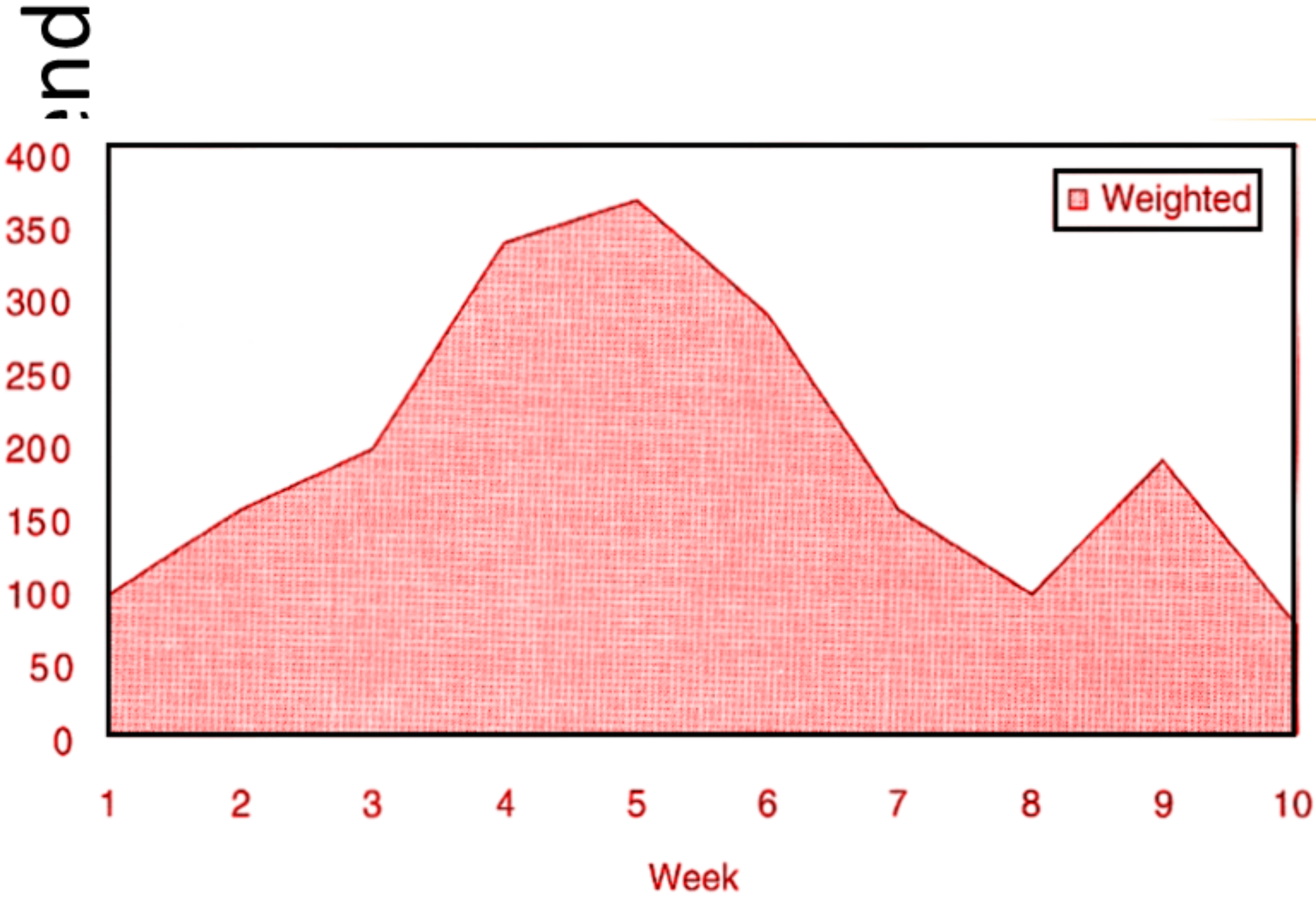
Answer #8: Weighted Defect Trend

- Defects classified
  - ~~Extreme (5)~~
  - ~~Critical (4)~~
  - Important (3)
  - Minor (2)
  - Cosmetic (1)
- Release when threshold is met

"showstopper" ≥ 50 pts

No extreme defects or critical defects. No more than 50 points.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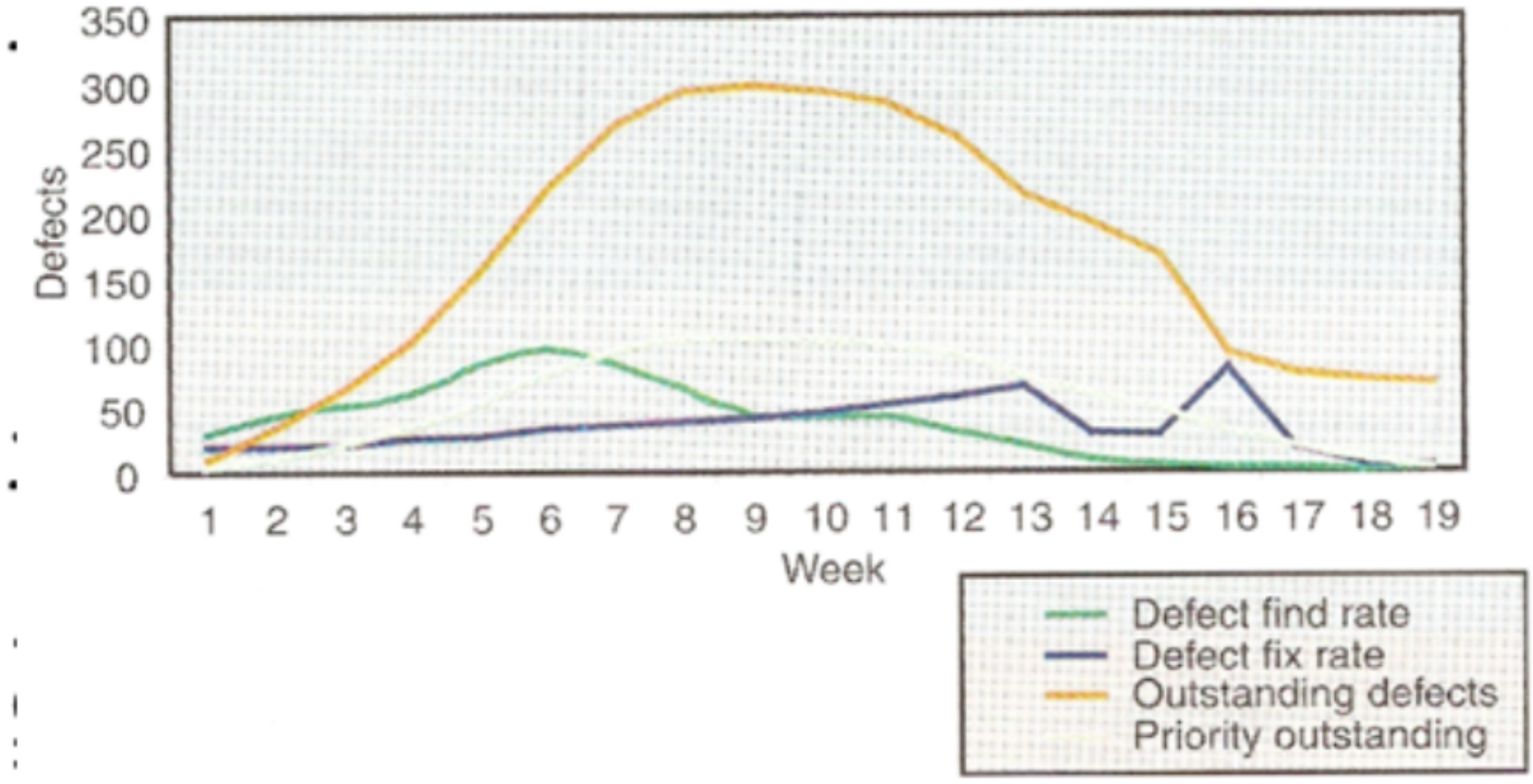
Defects
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Week
Defect find rate
Defect fix rate
Outstanding defects
Priority outstanding