# "You want to take *more* exams?"

## Standards-Based Grading in Calc 1

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Derivative computations

Alice: 0 0 10 10 10

Bob: 6 6 6 6 6

**SBG in a nutshell:**

- Define “learning targets” (**standards**)
- Explicitly test standards on each assessment
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**My reasons for using SBG:**

- Clearer understanding of student progress
- Focus on growth & eventual mastery
- Honest assessment of communication

**MTH 201: Calculus 1**

- $\sim$ 30 engineers, pre-service math teachers.
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**Existing class setup:**

- Flipped
- Group activities
- WebWork, Labs, Portfolio Problems, Exams

# My SBG Setup – by example

The number of children in a day care that are infected with stomach flu, $t$ days after the start of an outbreak, is approximately $F(t) = 50te^{-t}$.

The Inept Dr Van Clark says: "Because $F'(t) = 0 \cdot 1 \cdot e^{-t} = 0$, no children are ever infected." Explain what mistake(s) the Inept Dr made, correct his work, and write one clear sentence that explains the meaning of $F'(0)$ in real-world terms.

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✓ m S X

# Earn m's or ✓'s to master:

DA.1: I can correctly interpret the meaning of a derivative in context. [6]

# Final grades:

| Grade range | **Learning targets mastered** (there are 43 targets) | **Guided Practices completed** with a score of m or ✓ (there are 23 Guided Practices) |
|---|---|---|
| A | $\geq 38$ | $\geq 21$ |
| B | $\geq 34$ | $\geq 19$ |
| C | $\geq 30$ | $\geq 17$ |
| D | $\geq 25$ | $\geq 14$ |
| F | Have not **fully** completed **any** row. | |

# Everything can be revised once.

# Results: All-or-nothing grading

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+ Discretizes grades
+ Avoids point haggling
– Marks focused entirely on mistakes

**Change:**

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**Change:** Move to describing *progress*:
Excellent, Mastered, Progressing, No evidence.

## Results: Clear understanding of progress

+ *Very* clear
+ Student conversations
+ Student ownership
− Grade is “F” for most of the semester.
− “Am I on track?”

**Change:**

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**Change:** Reorganize into “Big Ideas”, arrange content standards chronologically.

## Results: Focus on eventual mastery & revision

+ Students *eventually* bought in – big time!

  *"I believe that this grade scale puts more emphasis on LEARNING instead of just getting a GRADE"*

∓ Free to make poor choices, come back from dead

– *Some* students abused revisions, did not improve

– "Point grubbing" $\rightarrow$ "assessment grubbing"

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**Change:** Revise by next exam.
Big Ideas, "Professionalism & Preparation"

## Results: Honest assessment of communication

+ Practice standards fit well, are meaningful.
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**Change:** More scaffolding, group practice.

# Other advice and reflections

- Propaganda! Needs lots of promotion & time.

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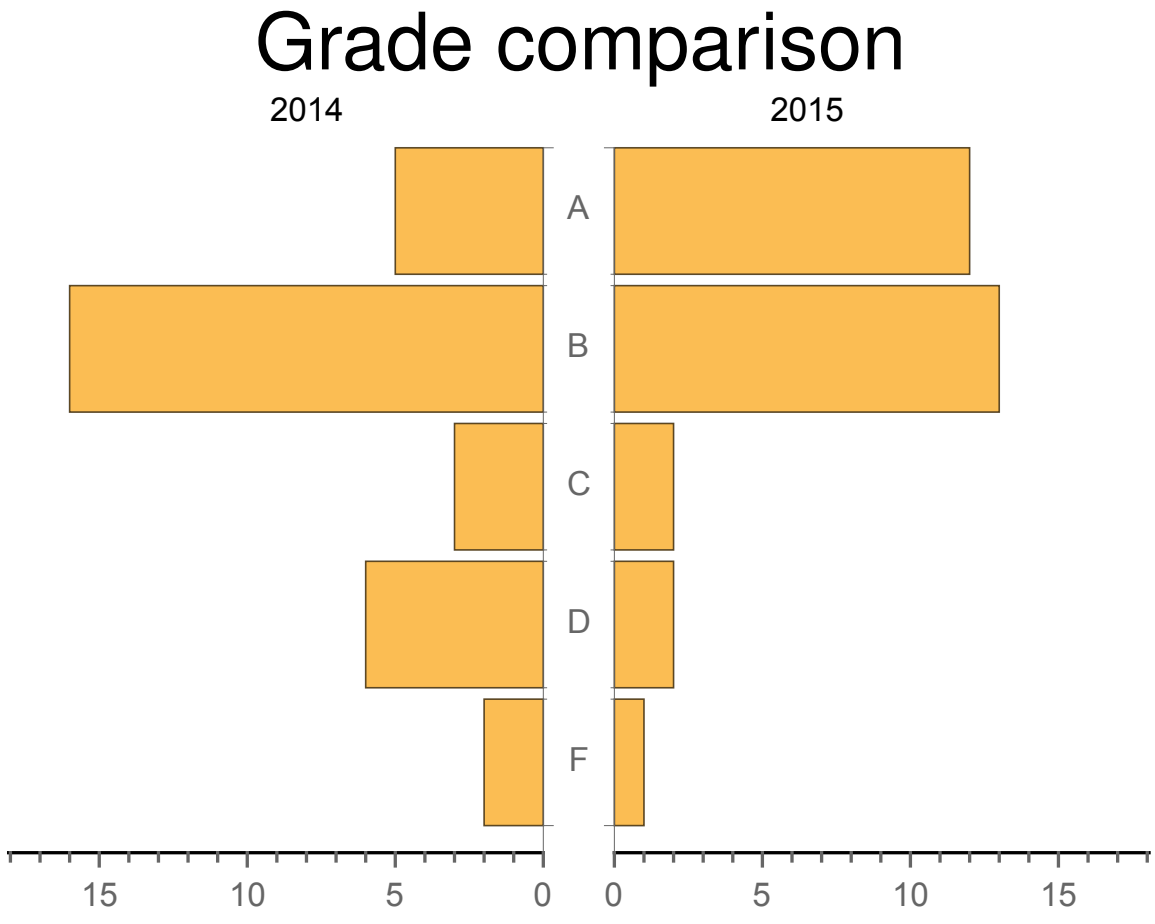
✓ SBG in Calc 1 is . . . **worth it!***

* but be prepared

Wait, who?

# Happy Birthday, Millard Fillmore!

Born January 7, 1800


Grade comparison
2014
2015
A
B
C
D
F
15
10
5
0
0
5
10
15

| Last | First | Pref. name | GRACE used | Portfolio #1 (1.1 #3) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Target* | | PS.1 | PS.2 | R.1 | C.1 | C.2 | C.3 | RC.1 | F.1 | D.2 | D.3 | DA.1 |
| [redacted] | [redacted] | [redacted] | 2 | ✓ | ✓ | ✓ | ✓ | S | ✓ | S | ✓ | ✓ | S | ✓ |
| [redacted] | [redacted] | [redacted] | 4 | | | | | | | | | | | |
| [redacted] | [redacted] | [redacted] | 2 | ✓ | S | ✓ | ✓ | S | ✓ | ✓ | ✓ | ✓ | m | ✓ |
| [redacted] | [redacted] | [redacted] | 4 | X | ✓ | S | S | S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| [redacted] | [redacted] | [redacted] | 4 | | | | | | | | | | | |
| [redacted] | [redacted] | [redacted] | 4 | X | ✓ | S | ✓ | S | ✓ | X | ✓ | m | S | S |
| [redacted] | [redacted] | [redacted] | 4 | X | ✓ | S | S | ✓ | ✓ | ✓ | ✓ | S | S | ✓ |
| [redacted] | [redacted] | [redacted] | 1 | X | ✓ | S | m | S | ✓ | m | ✓ | ✓ | m | m |
| [redacted] | [redacted] | [redacted] | 1 | X | ✓ | ✓ | m | S | ✓ | ✓ | ✓ | ✓ | S | ✓ |
| [redacted] | [redacted] | [redacted] | 1 | ✓ | ✓ | ✓ | S | S | ✓ | S | ✓ | ✓ | ✓ | ✓ |
| [redacted] | [redacted] | [redacted] | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| [redacted] | [redacted] | [redacted] | 2 | ✓ | ✓ | S | m | X | ✓ | m | ✓ | ✓ | S | ✓ |
| [redacted] | [redacted] | [redacted] | 3 | X | ✓ | ✓ | m | S | S | X | ✓ | S | S | ✓ |
| [redacted] | [redacted] | [redacted] | 3 | X | ✓ | S | S | S | ✓ | X | ✓ | ✓ | ✓ | ✓ |
| [redacted] | [redacted] | [redacted] | 3 | ✓ | ✓ | ✓ | ✓ | m | ✓ | m | ✓ | ✓ | m | ✓ |
| [redacted] | [redacted] | [redacted] | 2 | X | ✓ | S | m | S | ✓ | X | ✓ | ✓ | S | ✓ |
| [redacted] | [redacted] | [redacted] | 1 | X | ✓ | ✓ | ✓ | S | ✓ | ✓ | ✓ | S | ✓ | ✓ |
| [redacted] | [redacted] | [redacted] | 2 | X | ✓ | S | S | m | ✓ | S | ✓ | m | m | S |
| [redacted] | [redacted] | [redacted] | 4 | X | ✓ | ✓ | S | S | S | ✓ | ✓ | ✓ | S | ✓ |

| | | GP | PS: Problem Solving & Persevering | | R: Representation & Tools | | | LSG: Looking for Structure & Genenralizi | | C: Communication | | | | RC: Reasoning & Critiquing | | F: Functions | | | | | | L: Limits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Target*** | | GP | PS.1 | PS.2 | R.1 | R.2 | R.3 | LSG.1 | LSG.2 | C.1 | C.2 | C.3 | C.4 | RC.1 | RC.2 | F.1 | F.2 | F.3 | F.4 | F.5 | F.6 | L.1 | L.2 | L.3 | L.4 |
| ***Required*** | | | 2 | 6 | 4 | 4 | 2 | 2 | 2 | 6 | 6 | 6 | 2 | 6 | 2 | 6 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 |
| *Opportunities* | | 24 | 13 | 21 | 12 | 6 | 6 | 4 | 7 | 15 | 11 | 16 | 7 | 16 | 4 | 14 | 0 | 14 | 10 | 14 | 4 | 3 | 5 | 5 | 4 |
| [redacted] | [redacted] | 23 | 3 | 12 | 6 | 5 | 2 | 4 | 6 | 10 | 4 | 8 | 1 | 5 | 2 | 9 | 4 | 9 | 6 | 7 | 2 | 0 | 4 | 1 | 2 |
| [redacted] | [redacted] | 21 | 0 | 10 | 5 | 3 | 3 | 4 | 3 | 8 | 4 | 6 | 2 | 6 | 2 | 7 | 4 | 6 | 4 | 6 | 3 | 2 | 3 | 2 | 2 |
| [redacted] | [redacted] | 13 | 1 | 5 | 3 | 1 | 0 | 2 | 1 | 4 | 0 | 2 | 0 | 3 | 1 | 3 | 4 | 5 | 3 | 2 | 1 | 1 | 3 | 2 | 0 |
| [redacted] | [redacted] | 21 | 1 | 13 | 5 | 6 | 5 | 2 | 6 | 10 | 5 | 8 | 2 | 7 | 2 | 6 | 4 | 7 | 4 | 9 | 2 | 2 | 2 | 3 | 1 |
| [redacted] | [redacted] | 18 | 0 | 12 | 4 | 3 | 2 | 3 | 3 | 8 | 4 | 3 | 1 | 5 | 3 | 5 | 4 | 6 | 4 | 6 | 3 | 2 | 3 | 2 | 2 |
| [redacted] | [redacted] | 19 | 2 | 13 | 7 | 4 | 2 | 2 | 4 | 12 | 7 | 6 | 2 | 6 | 2 | 8 | 4 | 5 | 4 | 7 | 2 | 2 | 3 | 0 | 2 |
| [redacted] | [redacted] | 22 | 0 | 11 | 5 | 4 | 2 | 2 | 4 | 7 | 5 | 9 | 1 | 7 | 3 | 9 | 4 | 9 | 7 | 7 | 2 | 2 | 4 | 2 | 2 |
| [redacted] | [redacted] | 23 | 0 | 15 | 5 | 6 | 2 | 2 | 6 | 12 | 2 | 8 | 1 | 6 | 2 | 9 | 4 | 9 | 6 | 7 | 2 | 2 | 4 | 2 | 2 |
| [redacted] | [redacted] | 21 | 2 | 11 | 5 | 6 | 3 | 2 | 5 | 12 | 4 | 10 | 2 | 7 | 2 | 10 | 4 | 8 | 5 | 9 | 2 | 1 | 4 | 2 | 2 |
| [redacted] | [redacted] | 21 | 3 | 11 | 5 | 6 | 2 | 4 | 6 | 8 | 3 | 7 | 1 | 4 | 2 | 7 | 4 | 8 | 5 | 7 | 2 | 1 | 4 | 2 | 2 |
| [redacted] | [redacted] | 21 | 4 | 14 | 5 | 5 | 3 | 3 | 5 | 11 | 6 | 10 | 3 | 9 | 3 | 11 | 4 | 9 | 5 | 9 | 2 | 1 | 4 | 2 | 2 |
| [redacted] | [redacted] | 21 | 3 | 11 | 6 | 4 | 3 | 3 | 5 | 10 | 3 | 6 | 2 | 8 | 2 | 8 | 4 | 6 | 3 | 7 | 2 | 2 | 5 | 1 | 2 |
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| [redacted] | [redacted] | 21 | 1 | 13 | 6 | 5 | 2 | 3 | 5 | 11 | 5 | 7 | 1 | 6 | 3 | 9 | 4 | 10 | 5 | 8 | 2 | 2 | 4 | 3 | 3 |
| [redacted] | [redacted] | 21 | 3 | 15 | 5 | 6 | 2 | 3 | 7 | 14 | 7 | 9 | 1 | 9 | 2 | 10 | 4 | 8 | 5 | 9 | 2 | 1 | 5 | 1 | 2 |
| [redacted] | [redacted] | 20 | 0 | 12 | 7 | 6 | 2 | 4 | 7 | 12 | 4 | 4 | 2 | 5 | 2 | 10 | 4 | 9 | 6 | 9 | 3 | 2 | 4 | 2 | 1 |
| [redacted] | [redacted] | 14 | 0 | 12 | 7 | 4 | 5 | 3 | 4 | 11 | 5 | 10 | 3 | 7 | 2 | 7 | 4 | 4 | 2 | 9 | 3 | 1 | 1 | 1 | 1 |
| [redacted] | [redacted] | 22 | 1 | 16 | 7 | 5 | 2 | 3 | 5 | 11 | 8 | 6 | 2 | 1 | 3 | 10 | 4 | 8 | 4 | 10 | 2 | 1 | 2 | 1 | 2 |
| [redacted] | [redacted] | 19 | 1 | 13 | 8 | 6 | 4 | 3 | 6 | 9 | 4 | 8 | 2 | 7 | 3 | 10 | 4 | 7 | 4 | 8 | 3 | 2 | 4 | 2 | 1 |

| *Target* | *Required* | *Earned* | | *GP#* | *Grade* |
|---|---|---|---|---|---|
| PS.1 | 2 | 3 | | GP0 | ✓ |
| PS.2 | 6 | 12 | | 1.1 | ✓ |
| R.1 | 4 | 6 | | 1.2 | ✓ |
| R.2 | 4 | 5 | | 1.3 | ✓ |
| R.3 | 2 | 2 | | 1.4 | m |
| LSG.1 | 2 | 4 | | 1.5 | ✓ |
| LSG.2 | 2 | 6 | | 1.6 | ✓ |
| C.1 | 6 | 10 | | 1.8 | ✓ |
| C.2 | 6 | 4 | | 1.7 | ✓ |
| C.3 | 6 | 8 | | 2.1 | ✓ |
| C.4 | 2 | 1 | | 2.3 | ✓ |
| RC.1 | 6 | 5 | | 2.5 | ✓ |
| RC.2 | 2 | 2 | | 2.6 | ✓ |
| F.1 | 6 | 9 | | 2.7 | ✓ |
| F.2 | 4 | 4 | | 2.8 | ✓ |
| F.3 | 4 | 9 | | 3.1 | ✓ |
| F.4 | 4 | 6 | | 3.2 | ✓ |
| F.5 | 4 | 7 | | 3.3 | ✓ |
| F.6 | 2 | 2 | | 3.4 | ✓ |
| L.1 | 2 | 0 | | 3.5 | ✓ |
| L.2 | 2 | 4 | | 4.1 | ✓ |
| L.3 | 2 | 1 | | 4.2 | X |
| L.4 | 2 | 2 | | 4.3 | ✓ |
| D.1 | 2 | 0 | | 4.4 | ✓ |
| D.2 | 2 | 6 | | | |
| D.3 | 2 | 1 | | Updated: | |
| D.4 | 2 | 7 | | 12/30/15 | |
| D.5 | 4 | 6 | | | |
| D.6 | 4 | 4 | | | |
| D.7 | 2 | 3 | | | |
| D.8 | 2 | 2 | | | |
| D.9 | 2 | 2 | | | |
| D.10 | 2 | 4 | | | |
| D.11 | 2 | 1 | | | |
| DA.1 | 4 | 7 | | | |
| DA.2 | 4 | 5 | | | |
| DA.3 | 2 | 2 | | | |
| DA.4 | 2 | 2 | | | |
| DA.5 | 4 | 7 | | | |
| DA.6 | 2 | 3 | | | |
| FTC.1 | 2 | 3 | | | |
| FTC.2 | 2 | 1 | | | |
| FTC.3 | 2 | 2 | | | |
| | | | | | |
| | | | | | |
| ***GPs Completed*** | | 23 | | | |
| ***Targets Mastered*** | | 34 | | | |
| | | | | | |
| ***FINAL Grade*** | | B | | | |