Student Response Systems and Getting Students Talking

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NCTM Annual Meeting

April 19, 2013

Overview

- What are Student Response Systems (clickers)
- How clickers are commonly used
- How you *should* use clickers
- Examples from Pre-calculus & Calculus

What are clickers?

- A way to get feedback in your classroom
- Two "mainstream" brands: Turning Technologies & SMART Response Systems
- Not just an expensive quiz system!

How clickers are usually used

- Fancy/expensive way to ask multiple choice and true/false questions
- Jeopardy/Review games
- Ask a question…show the answer

How you *should* use clickers

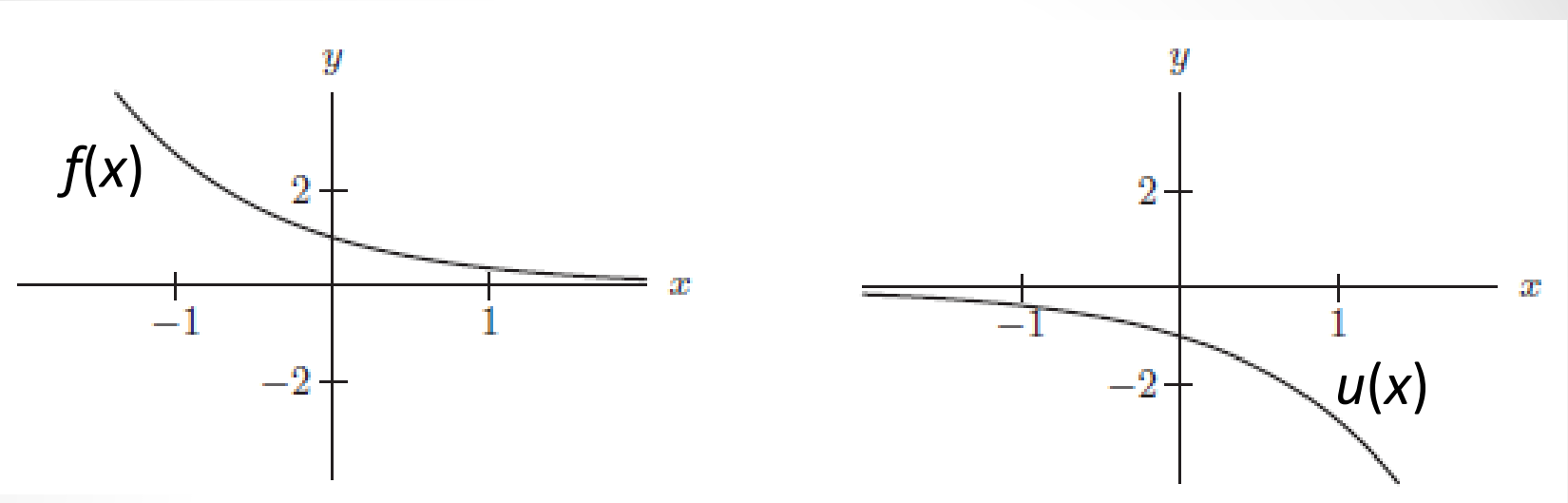
- Clickers should add *depth* to a mathematics lesson
  - This means they should not just be used for the sake of adding technology to the classroom
- Clickers should help to get students thinking and talking
- Not all clicker questions should be cut and dry

A Framework

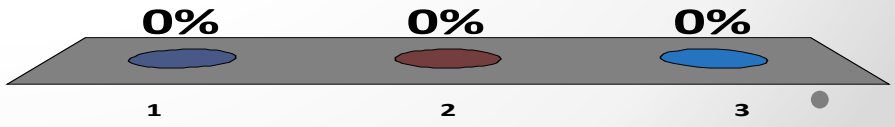
1. Notational
2. Quick Check
3. Misconception Addressing
4. Probing Questions
5. Use of language questions

Notational/Quick Check

Describe $u(x)$ *in* terms of $f(x)$.



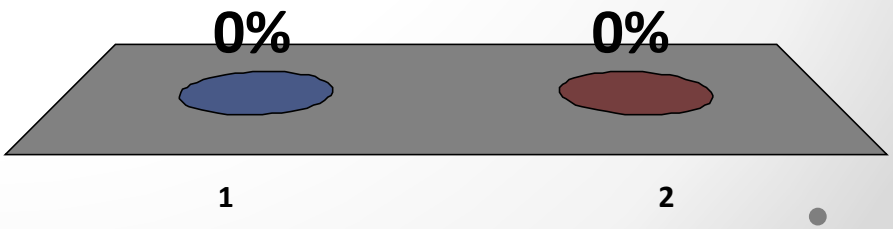
1. $u(x) = -f(x)$
2. $u(x) = f(-x)$
3. $u(x) = -f(-x)$



True or False?

$$\ln a \cdot \ln b = \ln(a+b)$$

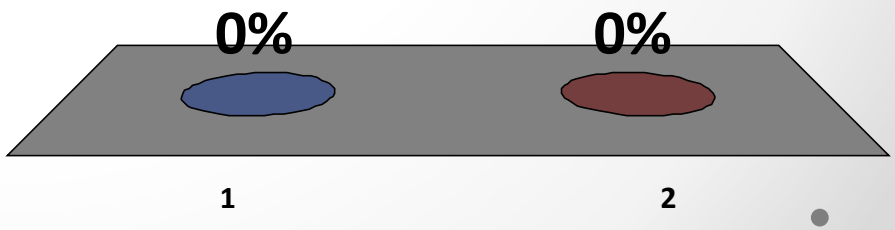
1. True
2. False



Misconception Addressing

If the domain of a linear function is all real numbers, then the range of that function must be all real numbers.

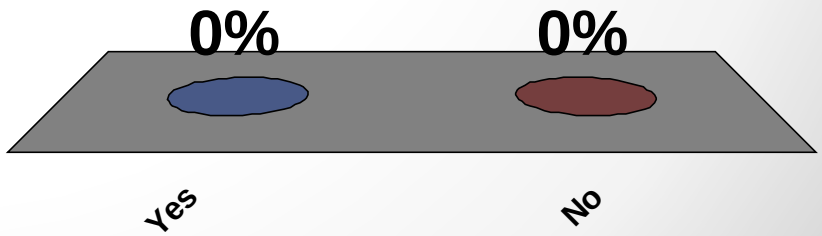
1. True
2. False



Probing Question

Is it possible to travel by land and by sea from the North Pole to the South Pole without crossing the equator?

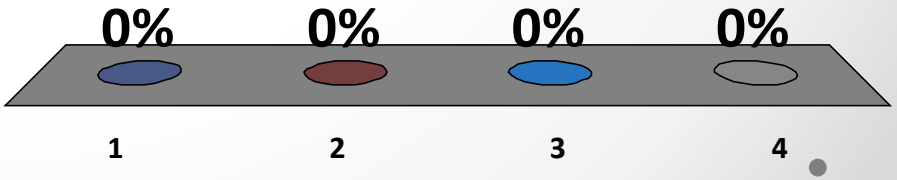
1. Yes
2. No



Use of Language Question

The sequence $a_n = (-1)^{n+1}$

1. converges
2. diverges
3. neither
4. undecided



What makes a good question?

- Uniform Distribution of responses
- Answer is not always clear—sometimes there are multiple answers that require justification
- Fits well with the flow of the lesson
  - Start class questions
  - Wrap up questions
  - Next lesson preparation questions
  - Class discussion questions

Where do I get clicker questions??

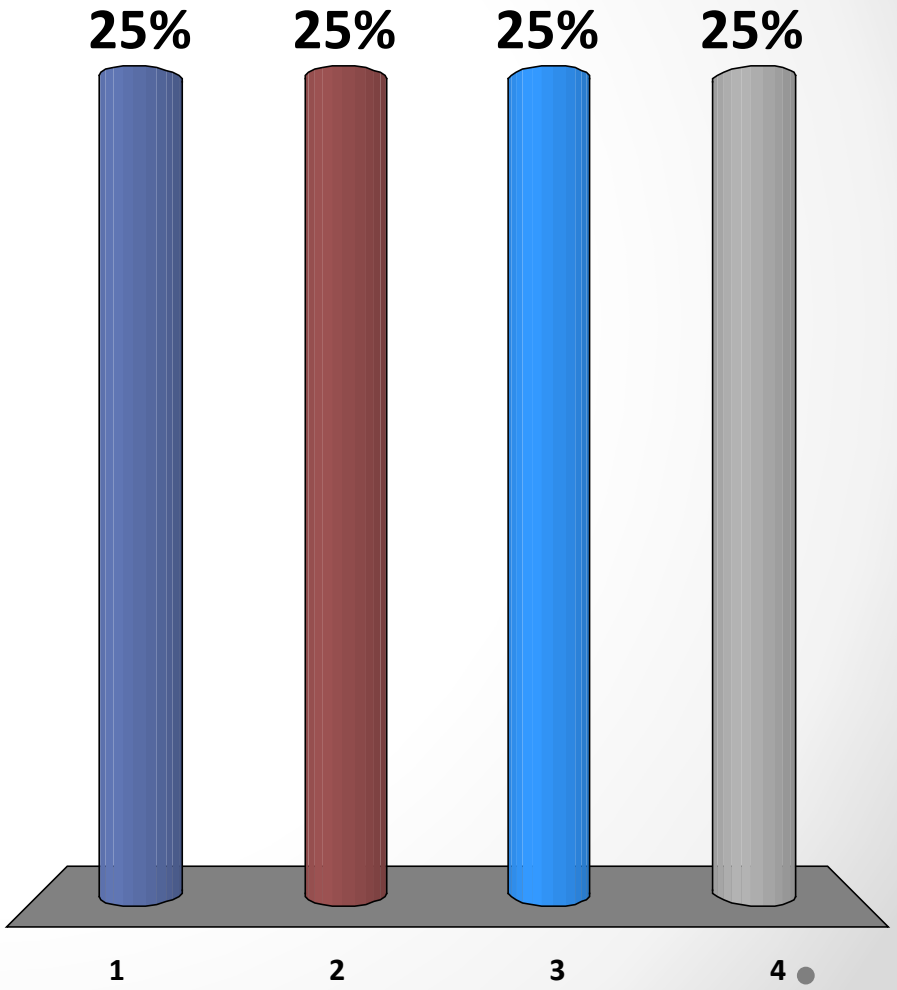
- Have your students write them!
- Observe while teaching
- Make traditional textbook questions more ambiguous
- Have a blank slide ready and harvest the solutions to a task as students work on them

Tips

- Don't filter responses—show no emotion!
- Expect students to respond to each other
  - Do not repeat their answers
- Don't include answers on the slides
- Re-poll questions to get students to resolve the problem
- Have students discuss with a partner first
- Getting good discussion going takes time

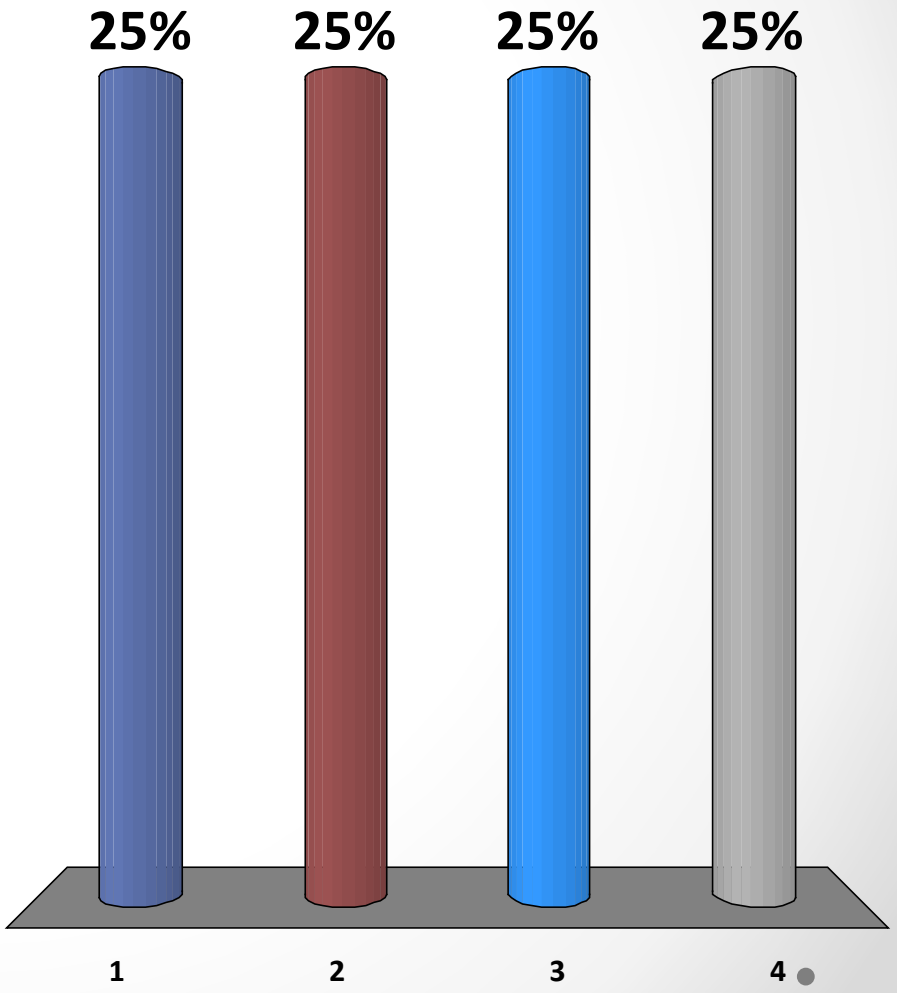
If f′(x) is increasing, then…

1. f′(x) is positive.
2. f(x) is concave up.
3. f(x) is increasing.
4. f″(x) is increasing.



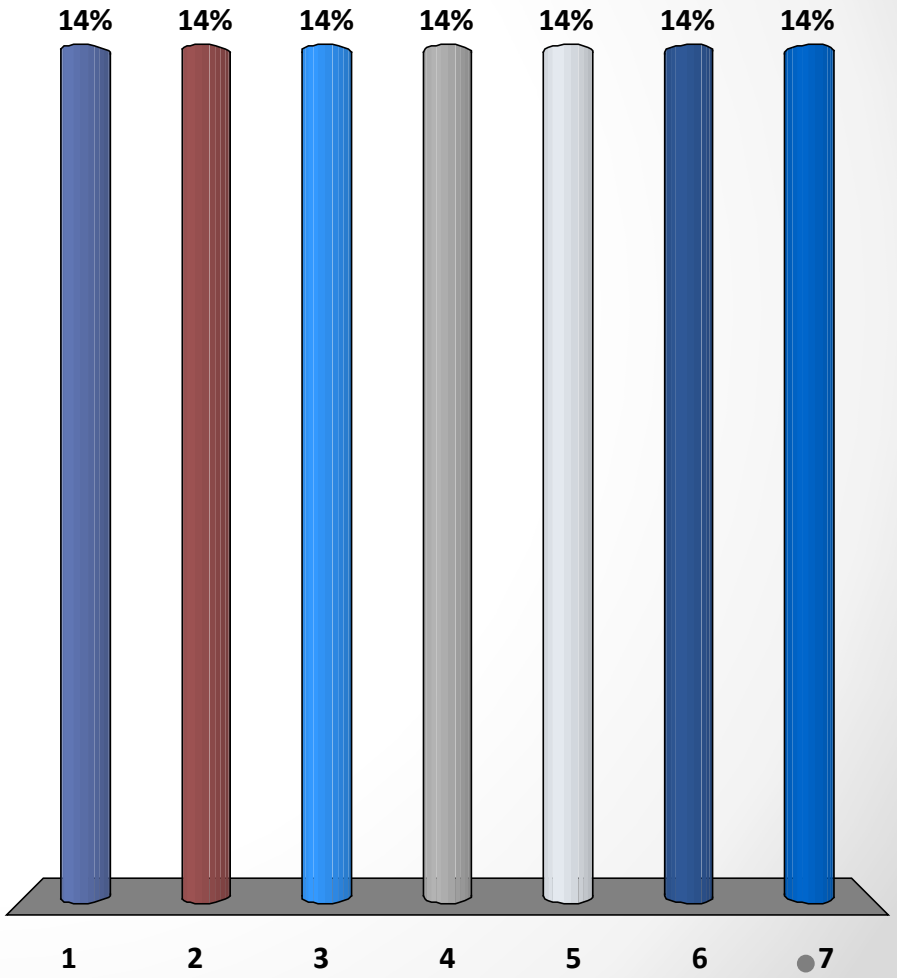
If f′(x) is decreasing, then…

1. f′(x) is negative.
2. f’(x) is concave down.
3. f(x) is decreasing.
4. f(x) is concave down.



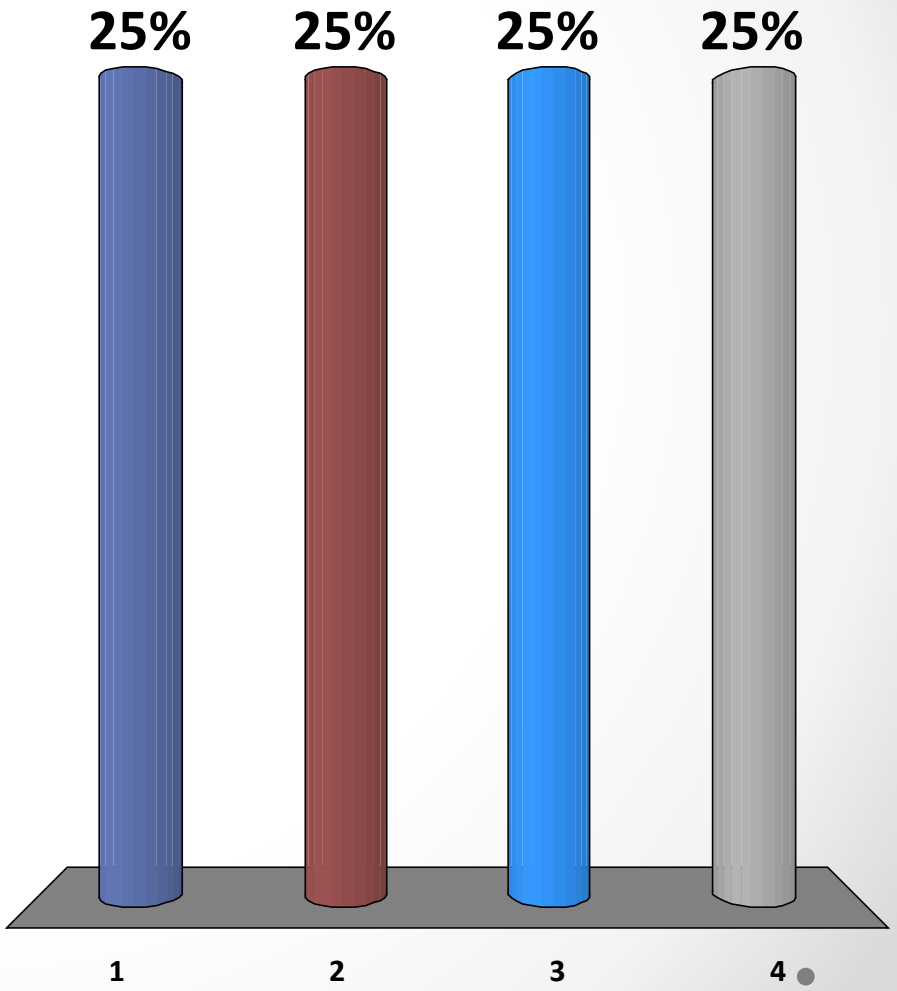
$$\lim_{x \to \infty} \sin(x) = ?$$

1. 1
2. -1
3. 0
4. ∞
5. -∞
6. Undefined
7. Does not exist



Which function requires the quotient rule to differentiate?

1. $\dfrac{3x^3 - 2\sqrt{x}}{x}$
2. $\dfrac{\sin(x)}{x^2}$
3. $\tan(x)$
4. $\dfrac{\cot(x)}{\csc(x)}$



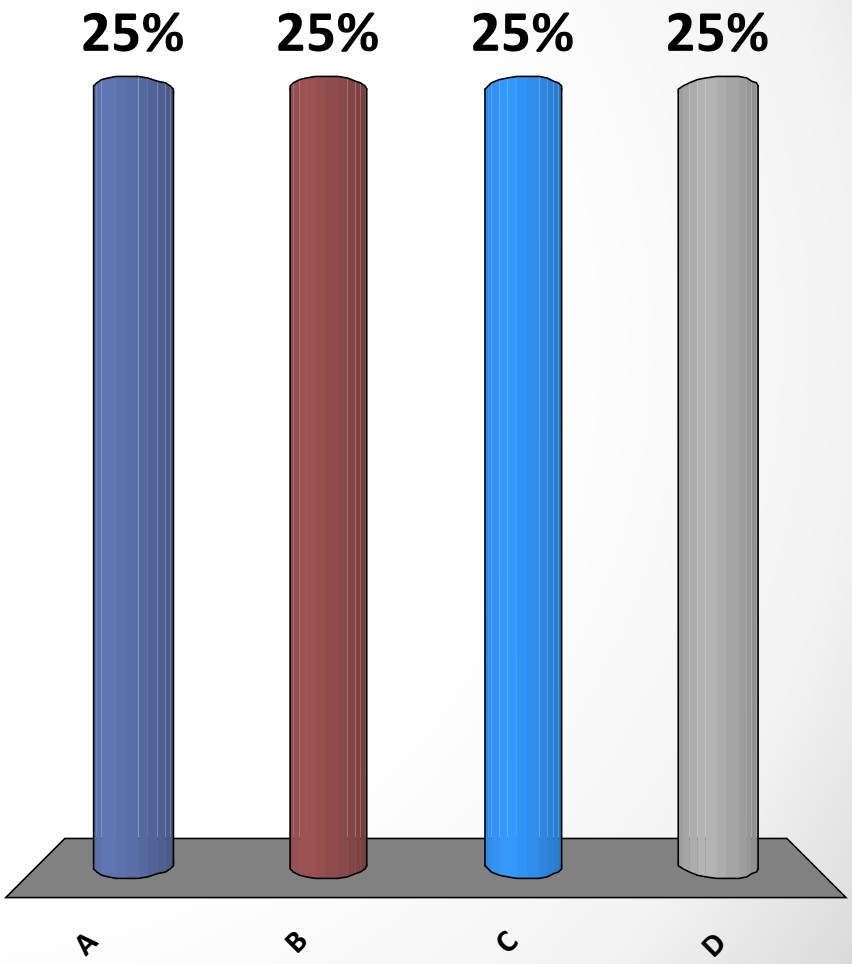
If $f(x) = ex$, find $\frac{d}{dx} f(x)$

A. e

B. e^x

C. $e + ex$

D. $e^x + xe^x$



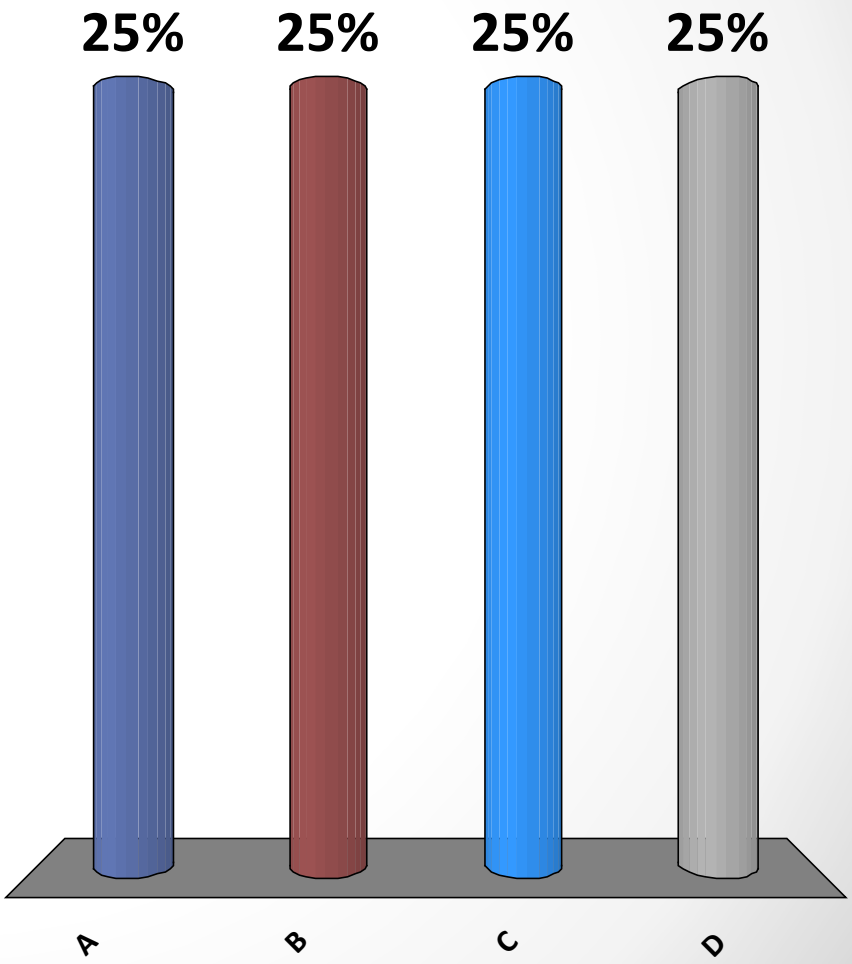
If $f(x,y) = x^2y^3$, which expression is equal to $\int x^2y^3dx$

A. $\int x^2dx \int y^3dx$

B. $y^3 \int x^2dx$

C. $\frac{1}{3}x^3 * \frac{1}{4}y^4$

D. $\frac{1}{3}x^3 \int y^3dx$



If $\frac{dy}{dx} = x + 2$, which function could possibly be y?

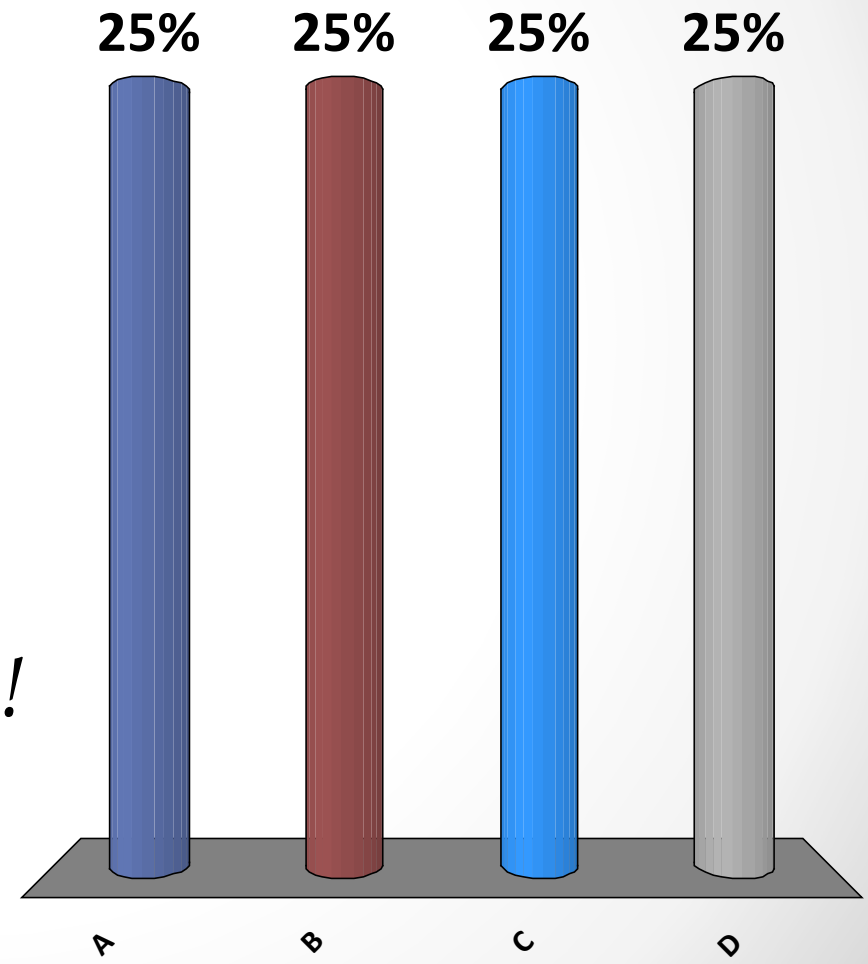
A. $y = x^2 + 2x + 2$

B. $y = 2x^2 + 2x + 2$

C. $y = \frac{1}{2}x^2 + 2x + 2$

D. $y = x^2 + \frac{1}{2}x + 2$

Be prepared to justify*!!*



Questions/Comments

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