

Utilizing Online Discussion Forums to Foster Mathematical Discussion

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Objectives of Session

- Understanding and choosing a discussion forum
- Implementing online discussions
- Using as formative assessment



Why Use Online Discussion Boards?

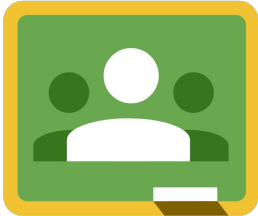
- Develop students' mathematical communication
- Effective teaching includes facilitating mathematical discourse (NCTM, 2014)
- Teachers can struggle to connect important mathematical concepts in the moment (Stein et al., 2008)

References

National Council of Teachers of Mathematics [NCTM]. (2014). *Principles to actions: Ensuring mathematical success for all*. [Adobe Digital Editions version].

Stein, M. K., Engle, R. A., Smith, M. S., & Hughes, E. K. (2008). Orchestrating productive mathematical discussions: Five practices for helping teachers move beyond show and tell. *Mathematical Thinking and Learning: An International Journal*, 10, 313-340. doi:10.1080/10986060802229675

Online Discussion Boards

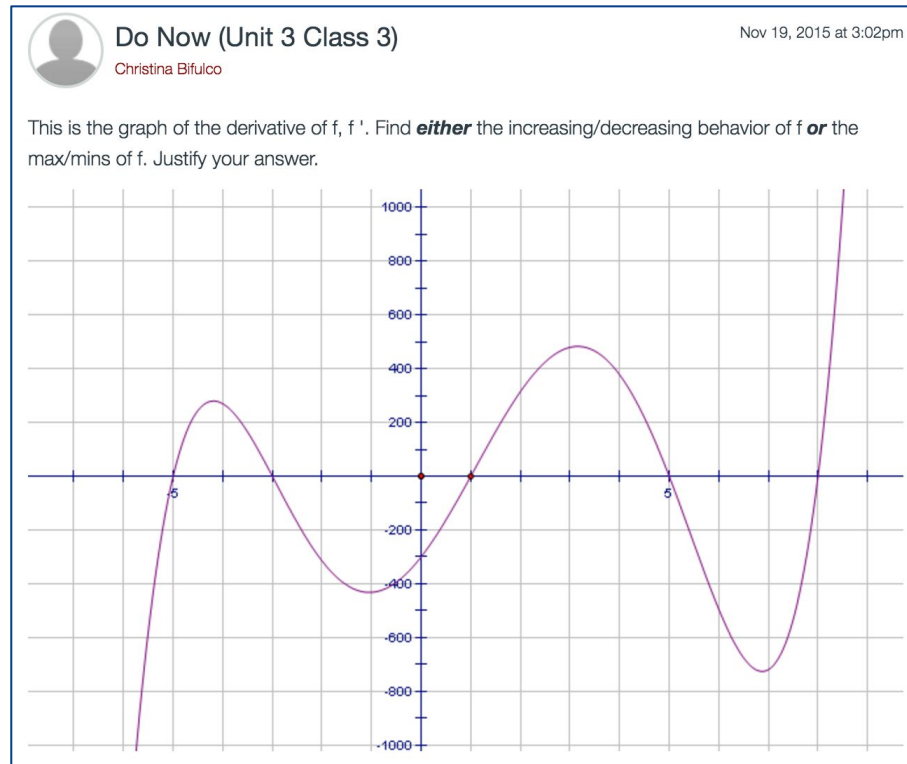


Features of Discussion Boards

- Force users to post before seeing others replies
- Equation editor
- Inserting pictures
- Inserting graphs
- Make posting anonymous

Encouraging & Supporting Justifications

- Promotes students' verbal explanations
- Analyze verbal explanations for equivalence and differences



Various Ways to Solve Problems

- Submit as pictures
- Use of different tools to solve problems



Modeling with Functions, Question 3

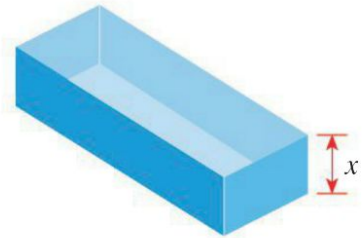
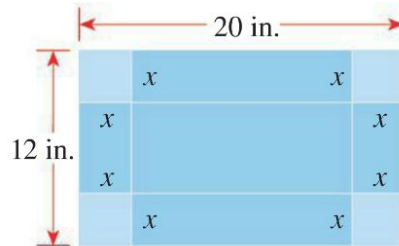
Christina Bifulco

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26. Volume of a Box A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 12 in. by 20 in. by cutting out equal squares of side x at each corner and then folding up the sides (see the figure).

- Find a function that models the volume of the box.
- Find the values of x for which the volume is greater than 200 in^3 .
- Find the largest volume that such a box can have.



Allow Student Work to Guide Discussion

- Allows students to practice "reading" mathematics
- Discussion extended to include efficiency, notation etc.



Various Ways to Find Derivatives

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You were all asked to find the derivative of:

$$y = \sqrt[4]{\frac{x^2+1}{x^2-1}}$$

Below you will see 4 different methods to find the derivative of the function. Pick one method and please comment on **how they found the derivative** (which rules/methods), or **efficiency of a method**, or even **another method that you could use** to complete this. Some of the replies can be related to personal preference (sometimes when you are comfortable with a method it is the most efficient for you to find the derivative). You can also **comment on notation**. You need only write a few sentences.

Method 1:

Handwritten student work for Method 1:

$$y = \sqrt[4]{\frac{x^2+1}{x^2-1}} \quad y = \left(\frac{x^2+1}{x^2-1}\right)^{1/4}$$

$$\ln y = \frac{1}{4} \ln |x^2+1| - \frac{1}{4} \ln |x^2-1|$$

$$\frac{1}{y} \frac{dy}{dx} = \left(\frac{1}{4}\right) \left(\frac{2x}{x^2+1}\right) - \left(\frac{1}{4}\right) \left(\frac{2x}{x^2-1}\right)$$

$$\boxed{\frac{dy}{dx} = \left(\sqrt[4]{\frac{x^2+1}{x^2-1}}\right) \left(\frac{2x}{4x^2+4} - \frac{2x}{4x^2-4}\right)}$$

Method 4:

Handwritten student work for Method 4:

$$y = \sqrt[4]{\frac{x^2+1}{x^2-1}} = \frac{(x^2+1)^{1/4}}{(x^2-1)^{1/4}} = (x^2+1)^{1/4} \cdot (x^2-1)^{-1/4}$$

$$y' = \left(\frac{1}{4}(x^2+1)^{-3/4} \cdot 2x\right)(x^2-1)^{-1/4} + \left(-\frac{1}{4}(x^2-1)^{-5/4} \cdot 2x\right)(x^2+1)^{1/4}$$

Comparing Methods or Techniques

- Teacher constructed solutions to compare



Solving Exponential Equations- Use log or ln?

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Jan 25 at 8:11pm

The class is asked to solve the exponential function $4e^{2x} + 2 = 16$. Lily does it in one way and Victoria does it in another way.

Lily's Method:

$$4e^{2x} = 14$$

$$e^{2x} = 3.5$$

$$\log e^{2x} = \log 3.5$$

$$2x \log e = \log 3.5$$

$$\frac{2x \log e}{2 \log 2} = \frac{\log 3.5}{2 \log 2}$$

$$x = \frac{\log 3.5}{2 \log e}$$

- Also can include incorrect solutions

Victoria's Method:

$$4e^{2x} = 14$$

$$e^{2x} = 3.5$$

$$\ln e^{2x} = \ln 3.5$$

$$2x \ln e = \ln 3.5$$

$$\text{since } \ln e = 1$$

$$x = \frac{\ln 3.5}{2}$$

Are both methods correct? Is one method better than another?

Including a Teacher Response

- Works best when you have the option of students not seeing posts until they have posted.
- Include a response to the post with some additional information

This is a graded discussion: 1 point possible

due Feb 8



Trig Identities

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Do you remember what the difference between a trig equation and a trig identity is? Type your answer in the response box and then use the π button to include one trig identity that you know.

Make sure you look at all the trig identities in the reply posted by your teacher!



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Feb 4, 2016



An identity is an equation that will be true for any value of the variable. Important ones that you should already know are:

Reciprocal Identities

$$\begin{aligned}\tan x &= \frac{\sin x}{\cos x} & \cot x &= \frac{1}{\tan x} = \frac{\cos x}{\sin x} \\ \csc x &= \frac{1}{\sin x} & \sec x &= \frac{1}{\cos x}\end{aligned}$$

Pythagorean Identities

$$\sin^2 x + \cos^2 x = 1 \quad \tan^2 x + 1 = \sec^2 x \quad 1 + \cot^2 x = \csc^2 x$$

Even-Odd Identities

$$\sin(-x) = -\sin x \quad \cos(-x) = \cos x \quad \tan(-x) = -\tan x$$

Some other considerations...

- Use online discussions to set the stage for an in class discussion
- Discussion or Assignment

What are some of your ideas?

Do you have any ideas about discussion topics or organization that could be helpful for others? Please share!



Questions?

Other Resources

- To make links easily accessible:
 - Create a QR Code at <http://www.qrstuff.com/>
 - Create a tiny url at tinyurl.com