Week 10
MTH-1321 – Calculus 1

Hello and Welcome to the weekly resources for MTH-1321 – Calculus 1!

This week is Week 10 of class, and typically in this week of the semester your professors are covering these topics below. If you do not see the topics your particular section of class is learning this week, please take a look at other weekly resources listed on our website for additional topics throughout of the semester.

We also invite you to **look at the group tutoring chart on our website to see if this course has a group tutoring session offered this semester**.

If you have any questions about these study guides, group tutoring sessions, private 30 minute tutoring appointments, the Baylor Tutoring YouTube channel or any tutoring services we offer, please visit our website www.baylor.edu/tutoring or call our drop in center during open business hours. M-Th 9am-8pm on class days 254-710-4135.

Key words: Rolle’s Theorem, Sketching Graphs

TOPIC OF THE WEEK:

Rolle's Theorem

This week's main topic is Rolle's Theorem. Rolle’s Theorem is a subset of the Mean Value Theorem. In the case of Rolle’s theorem, the average slope of the interval is zero. Rolle's Theorem essentially states that any real valued differentiable function that attains equal values at two distinct points must have at least one stationary point somewhere between them—that is, a point where the first derivative is zero.

3. Example of Rolle's Theorem

Given $y = x^3 - 4x$

Find a value in the interval $(-2, 2)$ which satisfies Rolle's Theorem.

First, verify that Rolle's Theorem can be applied:

$f(-2) = 0$ and $f(2) = 0$ and $f(x)$ is continuous and differentiable

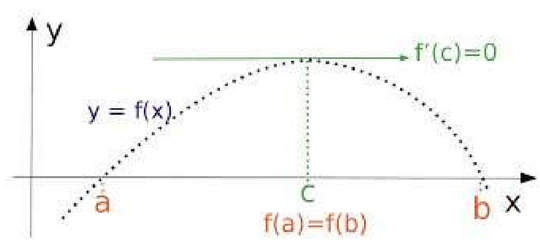
Then $f'(x) = 3x^2 - 4$

There must be at least one value of x between -2 and 2 for which $f'(x) = 0$.

Set $3x^2 - 4 = 0$

$$x^2 = \frac{4}{3}$$

$x = \pm\dfrac{2\sqrt{3}}{3}$, so there are two values which satisfy Rolle's Theorem!

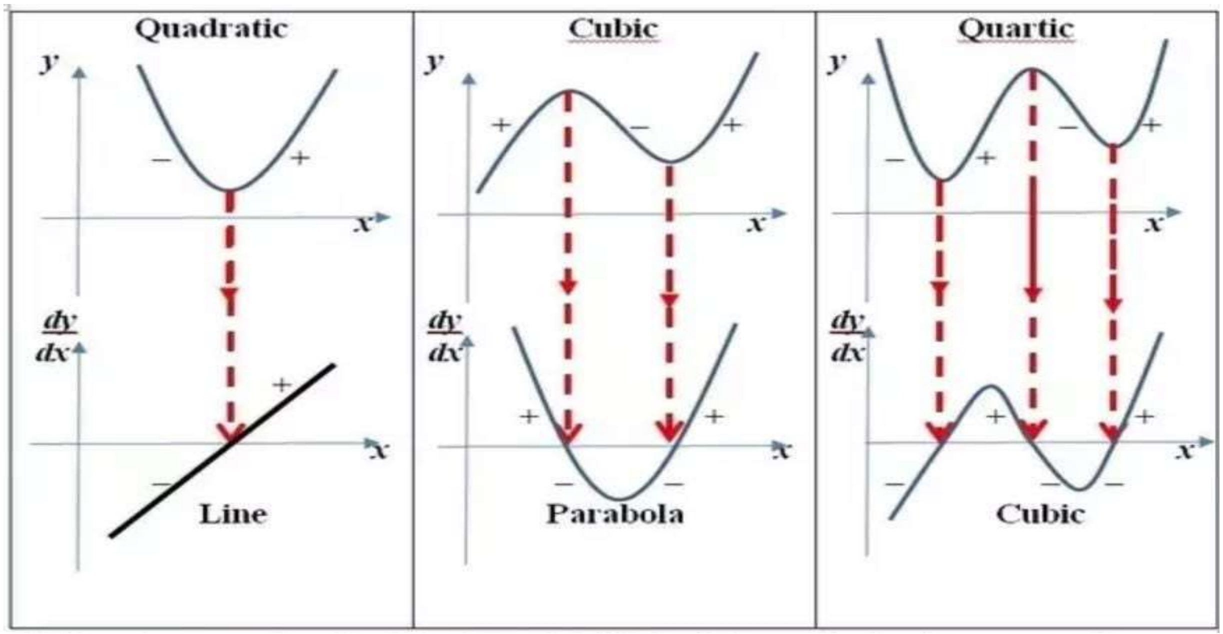


https://en.wikipedia.org/wiki/Rolle%27s_theorem

Highlight #1: Sketching Graphs

This chart is recap of what we learned about the second derivative test, second derivative test, critical points, inflection points, and concavity. Some rules to know when determining gra ph shape are as follows.

f'(x) = 0 translates to a critical point	
f'(x) = + means f(x) is increasing in the interval	
f'(x) = - means f(x) is decreasing in the interval	
f''(x) = 0 translates to an inflection point.	
f''(x) = + means f(x) is concave up	
f''(x) = - means f(x) is concave down	
f''(x value of critical point) can be used to tell us if it is a minimum or maximum depending on if it = a + value or – value (+ = concave up and - = concave down)	f''(critical point) = + means f''(critical point) = - means



https://www.quora.com/How-do-you-graph-the-derivative-of-a-function-given-the-graph-of-the-original-function

I highly recommend watching Baylor's Tutoring videos on Sketching Graphs!

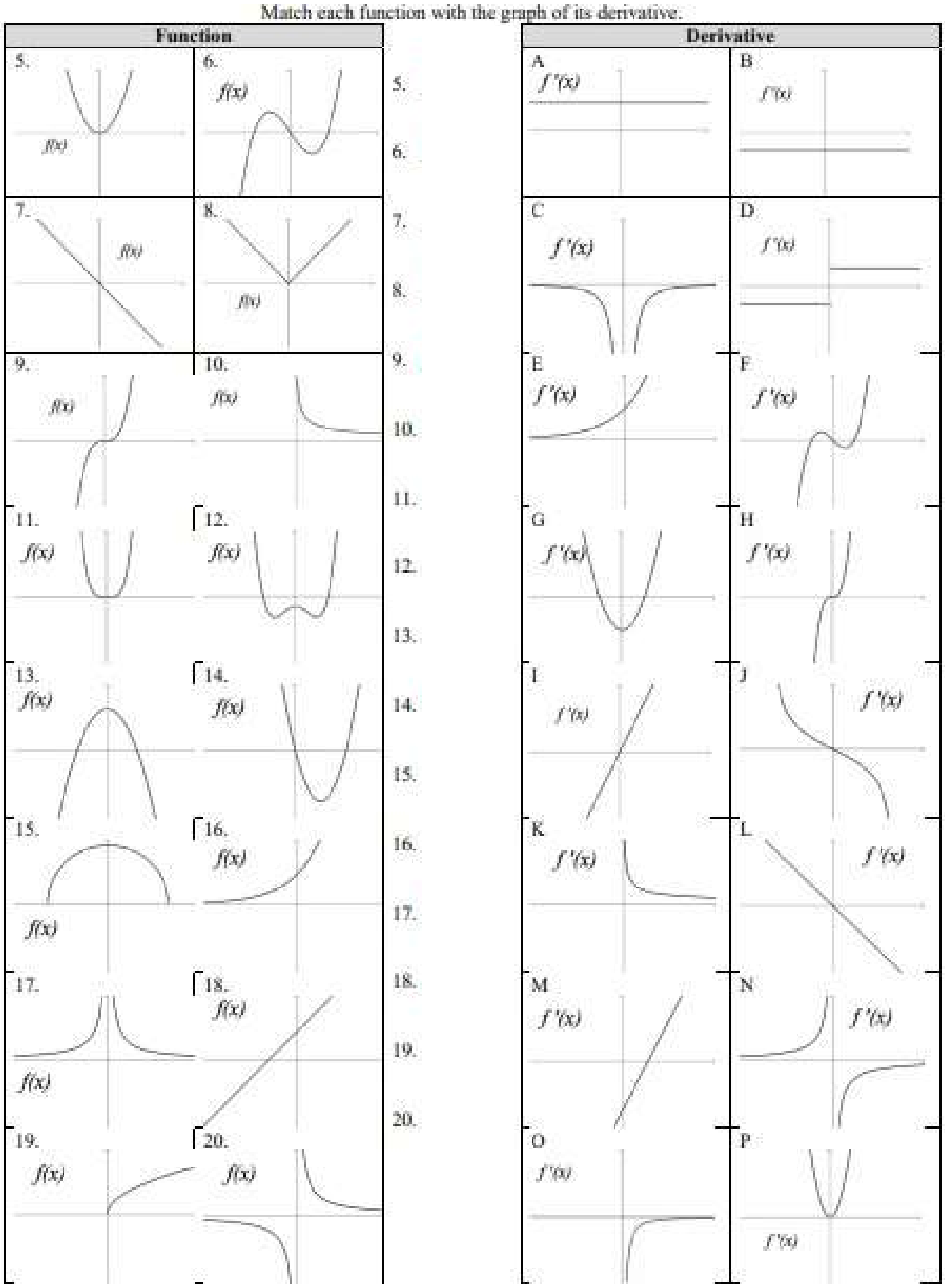
Video # 1 https://www.youtube.com/watch?v=l1YHElEgbog

Video #2 https://www.youtube.com/watch?v=FwSaJDzhRZo

CHECK YOUR LEARNING

(Answers below at the end of the document.)

Ex. 1) f(x) = - x^2 + 6x - 6 for 1 ≤ x ≤ 5. It is continuous and differentiable on the entire interval. According to the Rolle's Theorem, there exists at least one value (c) where f'(c)=0. What is the value of c?



Ex.2)

https://www.bartleby.com/questions-and-answers/match-each-function-with-the-graph-of-its-derivative.-function-derivative/a12c4690-13b4-4441-8fdc-ae5e9389ae04

Things you might struggle with

Sketching Graphs: Sketching graphs can be difficult and confusing but here are some steps that you can take to help. When making a graph:

1) Note where the critical points are

2) Determine if the derivative is positive or negative.

3) Each line you make should be going towards a critical point either from the bottom (negative) or the top (positive).

Thanks for checking out these weekly resources!
Don't forget to check out our website for group tutoring times, video tutorials and lots of other resources: www.baylor.edu/tutoring ! Answers to check your learning questions are below!

ANSWERS to check your learning section

Answer: c=3