Week 14
MTH-1321 – Calculus 1

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

This week is Week 14 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.

KEYWORDS: *Review of Major Concepts*

Final Review: We have covered all the concepts in Calculus I, so it is time to start reviewing for the final exam. Below are several concepts and key formulas you should review from previous resources. If anything is unclear, please look back at the resource where that concept is discussed in detail.

Highlight #1: Chapter 2

Limit Definition

$$\frac{dy}{dx} = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

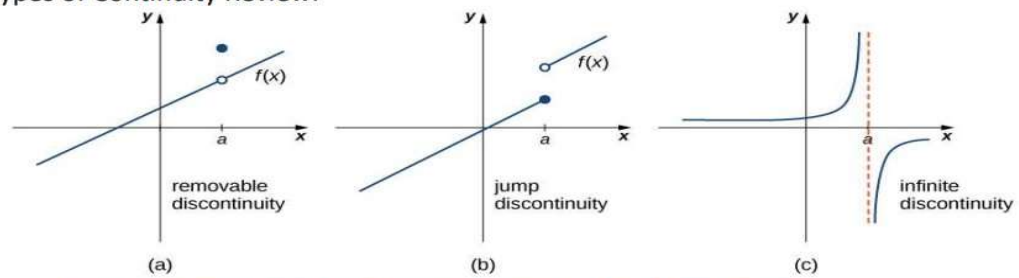
$$= \lim_{x\to a} \frac{f(x)-f(a)}{x \to a}$$

Calcworkshop.com

Squeeze Theorem

Squeeze Theorem Review: $If\ g(x) \le f(x) \le h(x), then \lim_{x->N} g(x) \le \lim_{x->N} f(x) \le \lim_{x->N} h(x)$

- Types of Continuity Review:



Source: https://math.libretexts.org/Courses/Misericordia_University/MTH_171-172%3A_Calculus_-_Early_Transcendentals_(Stewart)/02%3A_Limits_and_Derivatives/2.05%3A_Continuity

Highlight #2 Chapter 3

Product Rule: $(fg)'(x) = f'(x)g(x) + f(x)g'(x)$

Quotient Rule: $\left(\frac{f}{g}\right)'(x) = \frac{f'(x)g(x) - g'(x)f(x)}{g(x)^2}$

Chain Rule

$f'(x) = (\,g(h(x))\,)' = g'(\,h(x)\,)\,h'(x)$

- keep the inside
- take derivative of outside

multiply by derivative of the inside

Implicit Differentiation

Understanding Implicit Differentiation

$x^2y + xy^2 = 3x$

$\frac{d}{dx}x^2y + \frac{d}{dx}xy^2 = \frac{d}{dx}(3x)$

$x^2y' + 2xy\,y' = 3 - 2xy - y^2$

Trig Functions

- $\frac{d}{dx}\tan(x) = sec(x)^2$
- $\frac{d}{dx}sec(x) = sec(x)\tan(x)$
- $\frac{d}{dx}\cot(x) = -csc(x)^2$
- $\frac{d}{dx}\mathrm{csct}(x) = -csc(x)^2\cot(x)$

Higher Order Derivatives

$f(x) = x^4 - 5x^2 + 12x - 3$

$f'(x) = 4x^3 - 10x + 12$

$f''(x) = 12x^2 - 10$

Log function derivatives

$\frac{d}{dx}b^x = \ln(b) * b^x \quad \frac{d}{dx}\ln x = \frac{1}{x} \quad \frac{d}{dx}\log_b x = \frac{1}{(\ln(b)\cdot x)}$

CHECK YOUR LEARNING

(Answers below at the end of the document.)

1) What is the limit? $\lim_{x\to 1}\frac{x^2-2x+1}{x-1}$

2) What is the derivative of $\log_3 x^7$?

3) What is the derivative of f(x) = $\frac{3x^5}{lnx}$?

4) What is $\frac{d}{dx}(\cos(x))^2$?

5) Solve for $\frac{dy}{dx}$ $if\ y^7 + ln(x) = 27$

6) Example 4: What is the right- and left-hand limits as X goes to 0 of $\frac{1}{x}$.

7) Evaluate the $\lim_{h\to 0}\frac{\sin(9h)}{\sin(h)}$. *Hint*: Multiply numerator and denominator by (7)(11)t.

8) $\frac{d}{dx}\cot^{-1}(x)$

Things you might struggle with

Studying: Studying for the final can be daunting so I recommend that you start early and do a little everyday. Doing a little bit every day will allow yourself freedom to work on your other classes, time to seek help if you are stuck on a topic, and more time for your mind to really absorb the material. Feel free to come visit the tutoring center and let us review concepts with you as you prepare!

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

1) 0

2) $\frac{7}{\ln(3)*x}$

3) $f'(x) = \frac{lnx*(3*5x^5)-3x^5*\frac{1}{x}}{(lnx)^2}$

4) $2(\cos(x)) * (-\sin(x)) * \frac{dx}{dx}$

5) $\frac{dy}{dx} = \frac{-1}{x} * \frac{1}{7y^6}$

6) Answer: the left-hand limit goes to negative infinity while the right-hand limit goes to positive infinity

7) 9

8) $-\frac{1}{1+x^2}$