CONTINUATION OF MATH 223/224 INTRODUCTION TO CALCULUS/DIFFERENTIAL CALCULUS

See Math 224 Director's page for syllabus, old exams, and so on.

Also there you will find Math 224 weekly schedule of topics

I will assign Exercises in *Calculus*, Stewart, 9th ed. in addition to WebAssignments.

Sometimes I will collect a few!

WEEK 9/10 Oct 22-29

Fri Oct 22-Sun Oct 24 Read Sections 1.8 (intermediate value theorem) and 1.4 in Stewart *Calculus e-book*

Mon Oct 25-Wed Oct 27

- Continue readings in Sections 2.1 and 2.2 (derivatives; derivatives as a function)
- WebAssign schedule

The WA schedule is here for you to see easily. I want to avoid requests for extensions throughout the week.

CLASS WARMUP: Sec 1.4 Tuesday Oct 26, 8 AM

CLASS WARMUP: Sec 2.1 Wednesday Oct 27, 8 AM

CLASS WARMUP: Sec 2.3 Friday Oct 29 8 AM

Sec 2.2: Saturday Oct 30 11:59 PM

In case you didn't see the home page or the email, Math 224 are T/Th 1-3 at Office hours zoom link

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Wed Oct 27-Fri Oct 29

- View Determining derivative of quadratic and Square root function
- Sec 2.1 exercises #7, 10, 11, 19, 25; also, #3 entails using two versions of DQ to find slope of tangent
- Sec 2.2 #1, 3, 7, 11, 13 (graphs of derivatives from function graphs)
- View a no-frills Position, velocity, acceleration video
- Read Sec 2.3
- Finally, Finding f'(x) where f(x) = x^1/3. Prof Kumar is deliberate and his voice is calming. He covers a lot of territory that pertains to derivatives Please watch it!

Here is a collection of videos that show how to determine the equation of the line tangent to a function f(x) at a given point via the definition of derivative to get the slope and the point-slope form of the line to get the eqn. Watch as many as you need to:

Ex 1, Ex 2, Ex 3, Ex 4

Finally, the flip learning videos (mine, not Stewart's) *to help with the Sec 2.3 WebAssign*, watch The basic rules for derivatives and Power rule examples

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HALLOWE'EN WEEKEND EXERCISES, READING AND VIDEOS

- One last development of limit def of f'(x), in detail (recommended by a classmate!
- View Sec 2.3: derivative rules
- Here is Proof of product rule and

Proof of quotient rule as welll as Product rule examples, Quotient rule examples

- Sec 2.3 Exercises #1-49 *every* other *odd* (#1, 5, 9, 13, etc.), some of which you are *not* to use product or quotient rules, but instead to change the form as we did in Friday's class so the power rule is all that is needed) and #59, 63, 67, 83, 87 (I will go over these in class if you ask)
- Read Sec 2.4 and view Sec 2.4 derivatives of trig fcns, which you will need to complete the Monday warm up in WebAssign
- WebAssign Schedule:

Sec 2.2 Saturday Oct 30 11:59 PM (repeating reminder here)

CLASS WARMUP Sec 2.4 Monday Nov 1 08:00 AM

- Quiz Wednesday, through Sec 2.4

WEEK 11 Nov 1-Nov 5

View Squeeze theorem

Today's lecture on zoom [Note, by yesterday I hadn't assigned Sec 2.4 exercises, so ignore my comment asking if you had any questions]

QUIZ 1 ON WEDNESDAY covers Sec 2.1 to 2.4: Determine derivative from the definition, properties and rule, power rule shortcut, product and quotient rules, derivatives of the sine, cosine and tangent fcns

Do a bunch of the odd numbered exercises in Stewart Sec 2.4. I'll be more specific later.

Do next scheduled WebAssigns

Friday Nov 5-Sunday Nov 7

- Read Sec. 2.6 Implicit differentiation and view Video 2.6a
- Read Sec. 2.7 Rates of change in science + related rates and view Videos 2.7a and 2.7b
- Basic Skills Test begins on Nov 8
- **Essential exercises in Stewart so far** to help prepare you for upcoming Exam 1 and Skills Test:

Sec 2.4 p 154 #3, 7, 8, 13, 16, 23, 25, 39, 35, 37, 41, 45 (try also #47, 51)

Sec 2.5 p 162 #1, 3, 5, 9, 16, 18, 21, 34, 37, 45, 53, 51, 67

Sec 2.6 p 169 #3, 4 7, 11, 17, 21, 25, 29, 31, 39 (try #41)

WEEK 12 Nov 8-Nov 12

- See e-book exercises I posted over the weekend; have questions to go over in class
- Implicit differentiation lets us find dy/dx even when y cannot be expressed as an explicit function of x (or other relevant IROC, such as a related rate)

Watch Video 2.6 Implicit Differentiation, and from my collection: Implicit differentiation (ID) and More ID examples

- Now try the examples I posted on the weekend: Sec 2.6 p 169 #3, 4 7, 11, 17, 21, 25, 29, 31, 39 (try #41)
- Watch the Video 2.7 Rates of change in science and Video 2.8a Related rates 1 and Video 2.8b Related rates 2
- Next WebAssigns: Sec 2.8 Wed Nov 10 11:59 pm
- Basic Skills Test 1 began today, Nov 8; you have till Tues Nov 23 to take your 2nd and 3rd attempts covering limits, continuity, and differentiation formulas
- Implicit differentiation quiz
- Do Webassign 'FOR PRACTICE ONLY' Secs. 1.4, 2.1, 2.3-2.8 – especially Secs. 2.7 AND 2.8, as I might not get Stewart exercises from these sections listed
- wednesday notes implicit differentiation and related rates

Weekend before exam 1

WEEK 13 Nov 15-19

Mon-Tues Read Sec 2.9, linear approximation (the important corollary to genesis and meaning of derivative)

Watch the Videos 2.9a and 2.9b therein and whatever else I post

Do WA Warm-up Sec 2.9 (see WA site for date and time, which I extended)

Wed-Thurs Read Sec 3.1, max/min values and watch Videos 3.1a and 3.1b and any mini-videos I'll add

Fri-Sun View this: Best video for linear approximation and differentials

- Do e-book exercises Sec. 2.9 #1-3, 7, 13, 17 *and* Sec. 3.1 #1, 3, 9, 11, 17, 18, 31, 35, 41, 45, 51, 59
- Skipping Sec 3.2
- Read Sec 3.3, videos therein
- WebAssign as scheduled
- Open notebook quiz – short (after we go over the Sec 3.1 assigned exercises) on Sec 3.1
- Please have any questions for me to address in class on anything since exam

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WEEK 14

Mon Nov 22 - Sun Nov 28 THANKSGIVING BREAK WEEK

- If you are rusty in solving trig equations, here's the Nutley High School Trig Eqn Worksheet and Solutions
- Finding the critical numbers of a function is the first step to finding the signs of the first and second on an interval, to determine where a fcn is increasing or decreasing, hence the nature of its local extremes (max, min, neither), intervals of concavity, and points of inflection. The videos explain and give many examples of how to use the FDT and SDT, showing relevant examples done neatly and clearly.

Finding critical numbers of a fcn

Finding absolute extrema of f(x) on a closed interval

Finding intervals where f(x) increases and decreases

Determine local extrema of f(x) using first derivative test (FDT)

Determine local extrema of f(x) using second derivative test (SDT)

The function we did in class today, f(x) = x + 1/x, examined for extrema using FDT and SDT

* *Bulletin*: Mean value theorem/Rolle's theorem are NOT on the final; they show up in Math 225; but finding c such that f' = 0, is the skill needed to find *critical numbers* so reviewing it in the guise of Rolle's thm is great practice. The algebra is probably most people's difficulty. Imm making up a worksheet that tackles the usual trouble spots in solving all kinds of equations for their zeros.

Weekend assignment

- See my communication in WA about doing practice problems in sections covered but not assigned/graded. They provide practice and feedback without the weight of deadlines or scores.
- Reminder of past and a new set of exercises:

Sec. 2.9 exercises #1-3, 7, 13, 17

Sec. 3.1 exercises #1, 3, 9, 11, 17, 18, 31, 35, 41, 45, 51, 59

Sec. 3.3 exercises #1, 4, 11-14, 15, 17, 20, 21, 27, 43, 49, 62, 63

WEEK 15 Nov 15-19

Mon Thank you all for being flexible with the zoom today. You're great for helping me out so I can recover.

 Wednesday lecture will be on Zoom again. I will send the invite directly from zoom at 7:50 a.m.

(DUE WED) On paper, show all work, for quiz grade, no late papers: Sec 3.1 #41, 45; Sec 3.3 #43, 49

- Monday's lecture recording and Monday lecture's last function, graphed– notice, as we saw, since there was no POI candidate, there is POI; f inceases on (0, 1/4), decreases on (1/4, inf); hence, f(1/4) is local max (and absolute) max; *concave down* on entire domain (0, inf). At the end of the lecture I mused 'maybe f(1/4) is a cusp,' which is ridiculous, since f'(1/4) = 0, hence exists! I edited that out : /
- Read Sec 3.4 limits at infinity and videos therein
- For Friday: Jot down in your notebook 1 exercise from *each* of Secs. 2.9, 3.1, 3.3, 3.4 for me to address the following week; I'll send around a 'sign up sheet' on which you will write the question exercise numbers down and *I will do as my hw over the weekend*

Wednesday Today's lecture video

Please keep reading Sec 3.4 carefully! And watch the videos therein. Also:

- View Limits at infinity of rational functions and Graphing rational functions
- View Limits at infinity for a root function
- Sec 3.4 #1-31 odd
- In-class brief quiz Friday on Sec 2.9, finding L(x) for f(x) near some value x = a; use it to approximate the function at x near a), 3.1-3.3 using critical numbers and POI to describe the graph of a polynomial, including all features (local extrema, POI, intervals of increase/decrease/concavity) and sketch it!

WEEKEND AND LAST WEEK OF COURSE, DEC 4-10

- Read Sec 3.5 and watch the videos therein. I'll add one brief set of exercises, from Sec 3.5
- Read the Calculus of Curve Sketching handout and do the unworked exercises at the end of it. Note, this study

guide doesn't have the rational functions and asymptotes on it. I am writing a “Part 2” but will probably not have it soon. So see the videos I posted last week.

The following are from the director, Prof Kazmierczak:

- NEW DUE DATE *Due Dec 10, counts 3% of course grade* Curve sketching assignment

Note regarding the above: The function for #1 has one x-intercept (root), and it's difficult to find its value. The root is approximately $x = 3.1$, so use this value for the x-intercept when doing #1.

- The are many problems in WebAssign for Sec. 3.5, for practice only, and will not be graded for the course. You should do them! They are your best prep for the final exam.

TUES DEC 14

Solutions to curve sketching homework

Stewart Sec 2.9 linear approx solns

Stewart Sec 3.4 limits at infinity and HA solns

Stewart Sec 3.5 summary of curve sketching solns

FINAL EXAM TOMORROW Wed. Dec 15, 2021, 03:15-05:15 PM IN LH 001