Scan of Chapters 1, 2, 3 of our text

The assignment is given on the day named.

You should have questions for me and be ready to answer mine on the previous day's assignment.

Quizzes will be announced for the most part, about one per week.

Making an *honest* effort daily to do HW is the *only* way to pass the course. Sometimes I collect a few problems. Maybe a hand-out or a take-home quiz. Sometimes, I do a desk check during the lecture break.

WEEK 1

Wed to Thurs: Read Ch 1 and 2; view first five videos at SUPPLEMENTAL MATERIALS

Further review: Simplifying radicals with constants only, With variables and Many videos on negative exponents

Do p 5 exercises: #1, 2, 7, 8

View: Finding domain of a function

Do p 16 exercises: #9-15

Fri-Sun View Graphing piecewise functions; do rest of Ch 2 exercises, pp 15-16, #1-6

Read Ch 3; view Break even problem 1 and Break even problem 2

The first problems in Ch 3 cover the review of lines, whose *general* form is px + qy + r = 0.

Do Ch 3 p 26 exercises #1-5

WEEK 2

Mon At the VIDEOS link, view the first group of videos (Cost, Revenue, Profit)

Do rest of Ch 3 exercises pp 27-28 #6-16.

Read Ch 4 (Exponential and Logarithmic Functions)

View Graphing exponential fcns (up to minute 7:30) and Graphing log fcns

And Solving exp eqns, Solving log eqns Ex 1 and Ex 2, Using change of base formula

Do pp 43-44 #1-5, 8 b e f g, 10 a c e f, 11 e f h, 12, 14, 18, 19, 20 a-e, 21 b d f

Wed Read Ch 5

At the VIDEOS link, view the second group of videos (Compound Interest)

Study for Quiz 1 Friday, Ch 2-5; draw up 1 page of thumbnail sketches of essential functions covered in class, which you may use on the quiz.

Here is a scan of My essential function sketches

YOU MAY NOT USE MY PAGE. Copy it in your own hand.

Fri-Sun Do Ch 5 exercises #1-7 and continue if you need practice with the extra exponent practice.

View the last two Ch 5 videos at SUPPLEMENTAL MATERIALS, on continuous compounding and effective interest rate.

View all (yes, all) limit videos at VIDEOS

Read Ch 6. (Stay tuned here. One other post to come, which is practicing graphing piecewise functions.)

WEEK 3

Mon Did you watch all the limit videos? Watch them again and use them and the examples in the book to do as many of the problems as you can so far.

Do Exercises p. 67 #1-12, #16-30 even.

The short of it is this: To find a limit, first plug in the x = a given. If you don't get a number, but get 0/0 or number/0, then you have to resort to algebra. The videos are your friend. I will be, too, but not till Wednesday.

Hint: I have posted the solutions already, so you could follow along.

Notes on Limits

Read Ch 9 *Continuity*

Wed Today's lecture notes on Limits and Continuity

Continuity video 1 and Continuity video 2

Find several more, including videos on graphing piecewise functions under Continuity in VIDEOS

Do Ch 9 pp 84-85 #1 a-e, 2 a-d, 4, 5, 6

Read Ch 7 and Ch 8

Short quiz on Friday on, compound interest, limits and continuity. No notes are allowed on this quiz.

Ch 5 Know all the formulas, n = finite and continuous compounding. Know how to solve for t. Effective interest rate.

Ch 6 Know how to take limits of all types, given a function and/or a graph.

Ch 7 Know the criteria of 'f is continuous at a point x = a' to use when you justify whether a function is continuous or fails. Be able to Graph a piecewise function. The video has two clear examples.

Don't forget to check SUPPLEMENTAL MATERIALS and VIDEOS for extra helpful materials.

Fri-Sun Do Ch 7 Exercises p 72 #1, 2, 3 a-d

View Difference quotient (DQ) and the definition of derivative

related_rates_take-home_quiz.odt

WEEK 4

Mon Read Ch 8. Then, view the video, where Patrick finds the equation of the tangent line to f(x), but already has the derivative function f'(x) and evaluates it at the given point to get slope m. (Rather than doing the calculation of the limit of the DQ). This gives you the overall picture: Finding equation of tangent line to the curve

Homework on limit of difference quotient to hand in on Wednesday! Remember, it's easier to find the general limit at x = a, then substitute the three values -1, 0, 1 into this (the derivative!)

Do Ch 8 Exercises p 78 #1, 2, 3, 4 *using the derivative formulas*

Tues-Wed *Review worksheets for Exam 1*

I've extracted and entitled Supplemental Materials worksheets here. Practice what you need:

- Piecewise function worksheet
- Limit worksheet
- Finite and continuous compounding of interest worksheet
- Equation of line tangent to f(x) worksheet #2a and #3 a,b only

Solutions are found at Solutions to worksheets

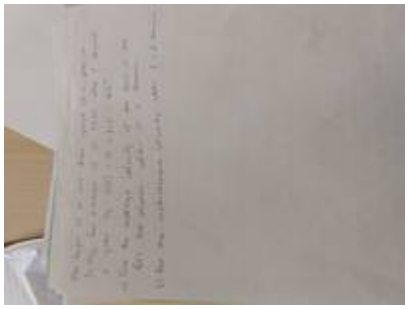
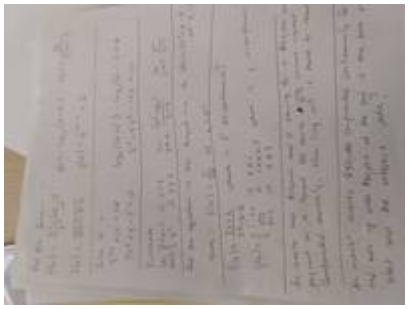
Wed-Thurs Exam 1 Topics:

Essential graphs; function of a domain (interval notation); piecewise functions; intercepts (y and roots); limits; continuity; linear cost, revenue, profit; compound interest (solving for various unknowns, whether F, P or t); slope of tangent using definition of derivative (limit of DQ etc.) and equation of tangent line at a point of f(x).

As usual, some interpretation of answers, like marginal cost, time to double with finite vs continuous compounding, word problems on derivatives.

I meant to post this: Compound interest summary

And here is what I did in class from Dan McKinney's practice: Practice for exam 1 and practice_for_exam_1_key.pdf

 and 

WEEKEND HW **Fri-Sun** Read Ch 10 (derivative rules) and view relevant videos:

Shortcuts to the derivative

Proof of product rule

Proof of quotient rule

WEEK 5

Mon-Tues Watch again Shortcuts to the derivative

Derivatives using power rule when n is not an integer

Do Ch 10, p 91 #3-6 and #16 a, b, c, d, o

I've moved some previous videos down, for Mon-Tues viewing:

View Basic product rule example

Proof of product rule using logs

Proof of product rule

Proof of quotient rule

Now do: Derivative worksheet Exercises 1 and 2 and Derivative worksheet for marginal cost, revenue, profit

Finally, view Chain rule explained

Read Ch 11

Wed Do Ch 10 p 91, #8-13 and #16 d-n

HELPFUL READING (*not* to hand in) The derivative and marginal cost, revenue and profit

View these short videos:

Ex of chain rule for radical function

Ex of chain rule for natural log function

Many great examples of chain rule involving ln[u(x)]

A couple more

Do Ch 11 p 96 #1, and in each of the multi-part #2, 3, 4 EVERY OTHER DERIVATIVE

Read Ch 12 (easy chapter on Leibniz notation and higher derivatives)

QUIZ ON FRIDAY Ch 10 and Ch 11

Here are the derivative worksheets again, and their solution files:

Derivative extra practice and Solutions

Basic derivative worksheet (supplemental) and Solutions

Chain rule derivative worksheet (supplemental) and Solutions

Fri-Sun Do Ch 11 p 97 #6-9, and in the multi-part #13 EVERY OTHER DERIVATIVE

Do Ch 12 p 107 #1, 2, 4, 5, 7, 9

Check out the worked applications of Marginal cost, revenue, profit: Ex 1 and another example Ex 2, which motivate the take-home

To hand in Monday:

Cost Revenue Profit analysis

WORK INDEPENDENTLY OR NO CREDIT. More credit is gained for personal–even if faulty–work that has effort and time behind it than you get for copying a friend's, which gets no credit at all.

In the pdf, please ignore the note at the end, 'Compare to sketch we did in class on Wednesday'.

Feel free to use graphing program like Desmos to make your graph. It needs to be accurate, so you will want to scale your axes smartly.

WEEK 6

Mon Read Ch 13. View both Implicit Differentiation videos at VIDEOS

Do Ch 13 exercises #1, 2, 3, 4, 8 (Tip: worked examples in the book will help you do homework problems)

Wed-Thurs First read related rates overview on Video page)

Then view:

Related rates 1: Area of circle and changing radius rate

Related rates 2: Area of triangle and changing side length rate

Related rates 3: Ladder sliding down the wall problem

Related rates in business

Finally, read Ch 14 and another text chapter on ID and RR

Do Ch 14 pp 121-122 #1, 2, 4, 5, 6, 9, 12, 14 (again, videos and worked examples in text will help)

PRACTICE QUIZ Friday, to test how you handle derivative computation without formula sheet. Includes implicit differentiation. To mark at desks and keep to study for quiz that counts on Monday.

Fri-Sun Read Chapter 13.

At the VIDEOS view first video on critical numbers.

Related rates take home Please do this neatly so I may mark quickly and return it before exam.

WEEK 7

Exam 2 is this Friday.

Topics are Chapters 10-15.

Mon-Wed Do Exercises in Ch 15

View Extrema

Critical numbers of fcn and excellent example to illustrate

More about excellent example in previous video

Patrick mjt finds critical numbers of a fcn

Patrick mjt does a harder example

Do Ch 15 pp 129-130 #1, 2, 4 a-i

Supplemental worksheets:

Related rates worksheet and Related rates worksheet solutions

Critical numbers worksheet

Tues-Wed Study these items for Exam 2, on Friday:

Ch 10-11 Derivative (the 'u-forms', product, quotient, chain rules); study both word problems and computation of derivatives.

Marginal analysis: the meaning of marginal cost, revenue and profit

Graphs of parabolas and lines

Ch 10-11: Derivatives (the 'u-forms', product, quotient, chain rules); both word problems and computation

Here's some extra reading with worked examples on log and exponential derivatives

Marginal analysis: meaning of marginal cost, revenue and profit

Graphs of parabolas and lines

Ch 12: Leibniz notation, meaning of dy vs delta y (dy does not equal delta y unless the f is linear); higher order derivatives

Ch 13-14: Implicit differentiation and related rates: finding eqn of all tangent lines to curve at given x (be able to find y's); word problems in related rates, including geometric (circle, cylinder, triangle) and application to commerce: df/dt = (df/dx)(dx/dt) where f = C, R, P, and so on

Ch 15: Local extremes of a function and critical numbers: identify local extremes from sketch, know definition of critical numbers, find critical numbers c such that f'© = 0 and what c give DNE for f' (review domain so you know what to discard as a possible critical number), identify if, for critical number c whether f© is local max or local min by applying def of loc ext (that is, check f(x) for a NEARBY x < c and x > c)

WEEK 8

Mon-Tues View Ch 16 and Ch 17 videos:

Mean Value, Rolle's and Intermediate Value theorems

The lecturer presents the general IVT: f is cts on [a, b], f(a) < f(b), though the function doesn't change sign. I showed the particular case, where f(a) < f(b) because the function changes sign on the interval. It's a useful form of the IVT, since most applications concern zeros of function.

Increasing and decreasing functions

First derivative test for local extremes

Read Ch 17 only!

Re-read Solutions Ch 15

I posted Ch 17 solutions–to guide your Ch 17 exercises. Refer to videos above as well (first)

Do Ch 17 p 141 #1, 2 a-m

Do like the video and reading:

1. Find all critical numbers of f(x)

2. Put them on a number line

3. Inspect sign of f' in each interval created: does f increase (f' > 0), decrease (f' < 0), or do neither?

Check your work against the posted solutions. (This is a little flippy in terms of learning, but it's straightforward.)

Wed View Second derivative test for local extremes: concavity

Read Summary of Ch 15, 17, 18

In place of the quiz tomorrow, you will have a take home problem to work out and I will collect. Quiz upon your return.

Read Ch 18

Fri On the following video, pay close attention to a good technique (3:45 onward) for creating the curve above the number line. He draws an actual rough sketch of the function!

View: Detailed examples of using first and second derivative to graph function

And, my Summary of Ch 15, 17, 18 The alternate text and the videos are the best.

Do exercises Ch 18 (in this order) #1, 3 a-e, 2 a, b, e, f, h

Here's my Example of a polynomial FDT and SDT for a polynomial

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WEEK 9 HOMEWORK FOR THE WEEK OF SPRING BREAK

Mon-Sun of Spring Break You are responsible to read Chapters 19-21 over the break, covering the three classes of curves: polynomials, rational and root functions

View Limits at infinity (horizontal asymptotes--including "tricks" at 6:16)

Graphing a simple rational function

Graphing a harder rational function

Another rational function

Sketching a more involved rational fcn with FDT and SDT

Read Ch 19; Do exercises Ch 19 #1 a b c, #2 a b c d f i

Spring break take home

Read Ch 20

WEEK 10

Mon Do exercises Ch 20 pp 167-168 #1 a b c, #3, 4 a-g #5 c d e f

Read Ch 21; do exercises p 174 #1, 2, 3

Read Ch 22, absolute extreme

Wed View Absolute Extrema

Do Ch 22 exercises p 185 #3, 4-8 (absolute min/max with business application questions)

The calculus of Ch 23-29 facilitates one of the main areas of problem-solving in the fields in economics and management. To optimize is to either maximize or minimize factors like cost, revenue, profit, demand, price, and so on. There are three categories of problems:

- Straightforward problems: Finding quantity or price that results in max/min of given cost, revenue, profit, demand function; Ch 22 has a few of these and we've done some in previous chapters
- Geometric (and other constraint) problems: Finding dimensions that enclose/contain a given amount, or finding amount that given dimensions will hold
- 'Hot dog' problems: Find optimal mix of price to sales to maximize revenue (among other categories)

Fri-Sun I shifted much of the Wed HW line down to here—plenty to do!

Again, read Ch 23 *Optimization* and view Fence problem 1, Fence problem 2, Box problem

Do those exercises *concerning the two topics we covered* (straightforward and container problems) *from among* Ch 23 exercises p 192 #2-5, 6, 9, 10, 12, 15, 16

And: Various optimization problems from another textbook

Be ready with questions from these two categories of HW problems on Monday

View the third category of optimization problem videos:

Computer software sales This video's two examples are similar to the lamp sales problem in the text (y-intercept in first example of the video is incorrect; it wouldn't be that n = 0 price reductions means $0 revenue–more about that in class)

The famous Hot dog problem

Slightly different approach to hot dog problem Optimizing revenue given two points of data

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WEEK 11

Mon If you need extra help on Optimization, you'll find excellent coverage in Bittinger et al. textbook and read in Ch 2, Sec 2.5, pp 262-272 in the pdf (the actual textbook pp, not the pdf pp)

1. Do Practice problems for optimization quiz to prepare for Wednesday; print the sheet of problem sheet, too, to bring in for the desk check

2. Finish Ch 23 exercises concerning the third category

3. AND DO THIS, TOO, NO KIDDING:

View Elasticity of Demand, a good video lecture

4. Read Ch 24 Elasticity

5. Read Price Elasticity of Demand

Wed Do Ch 24 exercises, p 199 #1-9

Fri Do Supp Mat'ls elasticity exercises on Elasticity worksheet

Skip Ch 25

Ch 26-27 covers multi-dimensional functions of the form z = f(x,y) (two independent variables, that is, two input; one output, as usual!)

Watch as much of the video Multivariable functions as you need to get the picture of how z = f(x,y) represents surfaces in 3-space. Though a advanced as a graphing exercise, it is insightful in terms of input (x, y) and output z = f(x, y).

Read Ch 26 (notation of z = f(x,y)

Do Ch 26 p 212 #1-8

First, view this pretty good Khan academy partial derviatives, and don't worry about the trig term. (The derivative of y = sin x is y' = cos x, and the derivative of y = cos x is y' = -sin x. No problem!)

Then, view this rather old-fashioned sounding teacher in a Super cool graphics explaining partial derivatives

Then, view Partial derivatives up to 11:07. You might not get it on the first read, but that's ok.

Go on to read: Ch 27 (Partial Derivatives)

WEEK 12

Mon Watch again, this time to the end: Partial derivatives

Read *again* Ch 27 and study the text's examples. We prefer spare notation f sub x and f sub y to the Leibniz notation

Do Ch 27 exercises p 219 #1 a b c e f i, 2, 3, 4

[A word about Ch 28: Although we're skipping it, finding local extremes of surfaces in 3-space can be visualized because it's analogous to finding extremes in 2-space, though more complicated, because of the first and second degree partials. In fact, there are infinite possible directions a particle on a surface can move in the z direction with respect to x and y that are not parallel to x and y.]

Wed Patrick's Lagrangian multiplier method for solving optimization with constraint uses the same set up as our book. He begins with the general algorithm for three variables, x,y,z. But don't worry, as his example uses only two variables, x,y.

Read Ch 29 and the following scan Goldstein et al. (Wait for it.) Study the examples.

Start reviewing for the test.

Fri Now you can see the second method, which is a bit shorter and cleaner.

Prof. Kumar Ex 1, 2, 3, 4

Do pp 233-234 #1-4 Solutions are posted now.

Quiz will be a take home, to be gone over as a review on Monday.

Fri

Do Ch 29 p 234 #6, 7

[MORE PROBLEMS TO BE POSTED HERE FROM THE SCANNED MATERIAL]

WEEK 13

Exam 3 on Wednesday. First set of practice problems are filled in. Other topics will have problems later.

1. Review and practice optimization by Lagrange in Ch 7.5 of TEXT, Hoffman & Bradley

Cobbs-Douglas examples are well done and show how x and y are easily isolated. It would not be out of the question to see one on the exam, as long as the numbers are reasonable.

You may ignore any problems that entail f(x,y,z).

Practice end-of-chapter exercises: #1-11, 17-22. The answers to odd numbered ones are at end of text. Page numbers of the pdf don't match the page numbers of the actual book, so use the point and click on TOC to get to the sections you need.

2. Partial derivative short answer

3. Elasticity

4. Curve sketching

5. Optimization (other than by Lagrange)

Tues To study besides various materials and the text and my HW solutions:

Do a few from each of the *Worksheets 23/24/25, 28, 30, 40, 41, 44, 45* at SUPPLEMENTAL MATERIALS

Skipping absolute max/min this time.

Study your notes! Make sure you can answer briefly and clearly on things like the meaning of partials of business functions. Practice finding intercepts! Be able to do certain sketches without calculus, as we've often discussed.

WEEK 14

Fri-Mon

Read pp 372-376 of Ch 5 Integration in TEXT, Hoffman and Bradley

View Antiderivatives and indefinite integration and Examples of basic indefinite integration

Read also you text, Ch 30. But the other book first

Bring last week's take-home assignment for me to collect and grade

Wed Do Ch 30 p 242 #1 and 2 (watch Fri-Mon videos again if you need to)

Do #1-25 on p 381 of TEXT, Hoffman and Bradley

View: Finding a particular F(x), given initial (boundary) conditions (xo, yo)

Finish reading about initial (boundary) conditions in our book, Ch 30

Fri-Sun Do rest of our book's Ch 30 problems, and do p 382 of Hoffman #31-34, 41-47

Continue reading Hoffman Ch 5 to p 380

Read Ch 31; know rules for anti-differentiation on pp 237-238 (basically the same as the video examples)

View u-substitution and Another u-substitution

Do Ch 31 p 248 #1 a b c e f g i j k l

Read Ch 32

WEEK 15

Mon View Integration by parts