Overview of Exam Conditions

- Your exam is not in a regular class period. It will take place on Thursday, March 18, from 3:15 pm to 5:55 pm, in the Business Bldg, Room 105.

- This will be a closed-book, no-notes exam. You are NOT allowed
  - any printed materials
  - any written materials
  - a laptop or other computer
  - a cell phone or other communication device
  - headphones or earphones
  - anything that can connect to the internet

- You are allowed pens, pencils, erasers, a ruler or straightedge, and any calculator that meets the restrictions above.

- If you need blank scratch paper or graph paper, it will be provided.

- Expect to see about ten to twelve problems. Many of these will remind you of homework problems, but some may not. Any problems that do not seem like homework problems are doable using the techniques that you have been practicing in your homework.

- The exam will cover Sections 3.2–3.10, inclusive. Note that you will be retested over Section 3.2.

- The exam is designed to take about 1 hour if you recognize how to do each problem as soon as you see it. If you have done all the assigned homework, then this should happen for nearly all the problems. The exam is scheduled for 2 hours and 40 minutes in order to eliminate any time pressure.

Study Tips

- Do lots of homework!

  Warning!
The graded problems alone are not sufficient. Be sure you can work all the homework problems.

- You goal should be to do so much homework that you can look at a problem and immediately know what to do with it.

- Once you know what to do, you should be able to do it quickly.
• The only way to get to this point is to work a large number of homework problems.

• After you have worked all the assigned homework, you might want to test yourself on the following review problems.


**Related Rates.** Just make sure you do all the ungraded homework Section 3.9.


**Computing Derivatives**

You must be able to compute derivatives quickly, efficiently and correctly. No derivative should take you more than one line of work. (Although some problems are require algebraic simplification before or after you take the derivative.) In order to do this you must:

• Memorize the following derivatives.

\[ \frac{d}{dx} x^n = nx^{n-1} \]

\[ \frac{d}{dx} e^x = e^x \]

\[ \frac{d}{dx} \ln x = \frac{1}{x} \]

\[ \frac{d}{dx} \sin x = \cos x \]

\[ \frac{d}{dx} \cos x = -\sin x \]

\[ \frac{d}{dx} \tan x = \sec^2 x \]

\[ \frac{d}{dx} \cot x = -\csc^2 x \]

\[ \frac{d}{dx} \sec x = \sec x \tan x \]

\[ \frac{d}{dx} \csc x = -\csc x \cot x \]

• Either memorize all the derivatives of the other special functions — inverse trig and non-base e logs and exponentials — or know how to derive them.

• Memorize the product, quotient and chain rules. Recognize when and where each applies.

• Know how to use logarithmic differentiation. Recognize when and where it applies.

• Know how differentiate abstract and/or implicit functions.

**Using Derivatives.** Here is a brief list of the things you have to know how to do with derivatives. (As always, you need to understand that “slope” and “rate of change” are really the same thing.)

• Find slope at a point.

• Find where there is certain slope.

• Find the equation of a tangent or a normal line.

• Find where there is a certain tangent or normal line.
• Compute higher derivatives.
• Any of the above that involve abstract functions or implicit derivatives.
• Related Rates!

Other Problem Types.

• All of Section 3.3. This means knowing what position, velocity, speed and acceleration mean in terms of either derivatives or graphical data.
• Related Rates!
• Differential Approximation and/or linearization.