

**Exam 2 Review**  
**Calculus I**

**March 2024**  
**Prof. Nollet**

Look at home work, quizzes and examples from class, but practice is most important! Can you do similar problems without your book?

Exam 2 covers sections 3.1-3.10, the chapter on derivatives. A large part of the exam will test whether you know the derivative rules and how to combine them properly. There will be a question about computing the derivative using the limit definition. You can also expect at least one word problem on related rates, probably similar to one of the home work problems.

- 3.1-2 Slope of the tangent line to a graph, the **limit** definition of the derivative, notation for derivatives, graph of the derivative function, differentiability implies continuity, Understand how graphs of a function relate to graphs of derivatives.
- 3.3 Basic derivative rules, power rule, derivatives of  $e^x$ , constant multiple rule, addition/subtraction rule, product rule, quotient rule.
- 3.5 Derivatives of  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $\sec x$ ,  $\cot x$ ,  $\csc x$  and higher derivatives.
- 3.6 Chain rule for composite functions:  $y = f(g(x)) \Rightarrow y' = f'(g(x)) \cdot g'(x)$ .  
Or, if  $y = g(u)$  and  $u = f(x)$ , then  $dy/dx = dy/du \cdot du/dx$ .
- 3.7 Implicit differentiation - differentiating an equation to find slope of tangent lines.
- 3.8 Derivatives of inverse functions ( $g(x) = f^{-1}(x) \Rightarrow g'(x) = 1/f'(g(x))$ ) and derivatives of  $\ln x$ ,  $\log_a x$  and  $a^x$ .
- 3.9 Derivatives of the six inverse trigonometric functions  $\arcsin x$ ,  $\arctan x$ ,  $\arcsec x$ ,  $\arccos x$ ,  $\text{arccot} x$ ,  $\text{arccsc} x$ .
- 3.4 one dimensional motion: if  $s(t)$  is the position at time  $t$ , displacement, velocity  $v(t) = ds/dt$ , speed  $|v(t)|$ , acceleration  $a(t) = d^2s/dt^2$  and how to interpret signs, direction of motion.
- 3.10 Related rates problems. These are word problems using the derivative rules to find rates of change of physical quantities like angles, lengths, areas, volumes, etcetera.