

Math 400 Final Exam Review topics.

- Know your Precalc. Topics (Trig identities, limits, algebra rules for exponents, logs, exponentials, graphing, etc)
- Limits:
 - Def. of a limit
 - One sided vs. two sided. Vs. limits at infinity
 - When is a limit undefined vs. when is the limit infinite ($\pm\infty$)
 - Removable discontinuities
 - Squeeze Theorem
 - Special limits 1. $\lim_{\theta \rightarrow 0} \frac{\sin\theta}{\theta}$; 2. $\lim_{\theta \rightarrow 0} \frac{1-\cos\theta}{\theta}$; 3. $\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}}$
- Def of Continuity
 - Intermediate value theorem
- Def of a derivative (limit version) & techniques for taking derivatives
 - Concepts of what a derivative is
 - Sum/diff rule, constant multiple rule, power rule, product rule, quotient rule, chain rule.
 - Taking derivatives of Trig, natural log, exponential (base e and base a), and inverse trig functions
 - Implicit differentiation
- Related rates (I will pick two problems from the handout given in class, you do one)
- Mean value theorem (MVT) for continuous functions and for integrals
- Finding values of a constant for a piecewise function which make it satisfy the MVT
- Tests for Increasing and decreasing functions
 - Finding open intervals for which a function is inc. or dec.
- First derivative test (test for local max or min or neither)
- Finding extrema
 - Critical number vs. Critical point vs. local max/min
 - Local max. min vs. absolute max min
 - Critical point is an ordered pair, sometimes we state “local max @ x= ___”
 - Finding extrema on a closed interval (just don’t forget to check the end points)
- Second and third derivatives (what do they represent and how do you find them)
 - Finding potential inflection points
 - Concavity
 - Test for concavity
 - Finding open intervals of concavity
 - Second derivative test (for finding if a point is a local max/min using the second derivative)
- Def of Inflection point (potential inflection point vs. actual inflection point)
- Optimization problems (as discussed in class and on your homework) I provide two, you solve one.
- Integration (what does it represent, Total area vs. “net area”)
 - Definite Integral vs. Indefinite integral
 - Differential equations
 - Know what both fundamental theorems of calculus (FTC) say, mean, and do.
 - Be able to use the FTC (for definite integrals)
 - Be able to use symmetry and geometric formulas
 - Rules of integration (know the tricks $\int x(3x+1)^{99} dx$, $\int \frac{\ln x}{x} dx$, $\int \tan 2x dx$, etc.
- Extra credit topics: Newtowns Method, Linearization, Trapizoidal method, Partitions and norms of partitions for a riemann sum