Review for Exam 1

Exam rules

- No notes or books nor cell phones are allowed. You are allowed to have a calculator, but not one that can do calculus. A scientific calculator is fine (that can do logs, exponentials, sines, sqrts, etc.).

- You have the full period to work on it. When you are finished, you can give me your exam and leave.

Format

- Questions will be similar to daily homework questions and weekly assignment questions.

- You must show your work. For example, if you need to evaluate a definite integral, you must derive the antiderivative and express how you evaluate it.

Topics

- From Calculus 1
    - Limit Definition of the Derivative (and other important definitions)
    - Tangent lines
    - Absolute max/min (and tests for)
    - Intervals of increase/decrease and local max/min
    - Intervals of concavity and inflection points
    - Area
    - Volume of solids of revolution
- Section 6.1: Inverse functions
    - One-to-one functions
    - Properties of inverse functions
    - Compute the inverse to a given function
- Section 6.2: Exponential functions
    - Exponent properties
    - Compute their limits, derivatives, and integrals ($\frac{d}{dx}(e^x) = e^x$, $\int e^x \, dx = e^x + C$)
- Section 6.3: Logarithms
    - Solve exponential equations
   - Logarithm properties

- Section 6.4: Logarithm derivatives
    - Compute their limits, derivatives, and integrals ($\frac{d}{dx}\left(\ln(x)\right) = \frac{1}{x}$, $\int \frac{1}{x}\,dx = \ln(|x|) + C$)
- Section 6.6: Inverse trigonometry
    - Inverse sine, inverse cosine, and inverse tangent
    - Compute their limits, derivatives, and integrals ($\frac{d}{dx}\left(\sin^{-1}(x)\right) = \frac{1}{\sqrt{1-x^2}}$, $\frac{d}{dx}\left(\cos^{-1}(x)\right) = -\frac{1}{\sqrt{1-x^2}}$, $\frac{d}{dx}\left(\tan^{-1}(x)\right) = \frac{1}{1+x^2}$)
- Section 6.8: Indeterminate limits
    - L'Hopital's rule
    - The different indeterminate forms

Studying

- Try problems you haven't worked from the exercises from the corresponding section of your calculus book. For those problems that ask you to use a graphing calculator, on our exam I would give you the graph.

- Review the weekly assignments. Remember which ones caused you the most trouble. Find similar examples in the textbook and the posted outlines, then try similar exercises in the textbook.

- Visit either me or the Math/Stats tutoring lab in MEP 457 for walk-in tutoring by upper level math/stats students with your questions.

Sample questions

1. Let $f(x) = -3 + 4^{2x-1}$.

    1.1. Find an equation for the tangent line to $y = f(x)$ at $x = 1$.

    1.2. Find a formula for $f^{-1}(x)$.

2. Let $g(x) = \tan^{-1}(x^2 + x) + \pi$.

    2.1. What is the domain of $g(x)$?

    2.2. What is the range of $g(x)$?

    2.3. Find all critical numbers for $g(x)$ and for each determine if each produces a local maximum point, a local minimum point, or neither.

3. Find the area of the region bounded by $y = \frac{1}{x}$, $y = -1$, and $x = -2$.
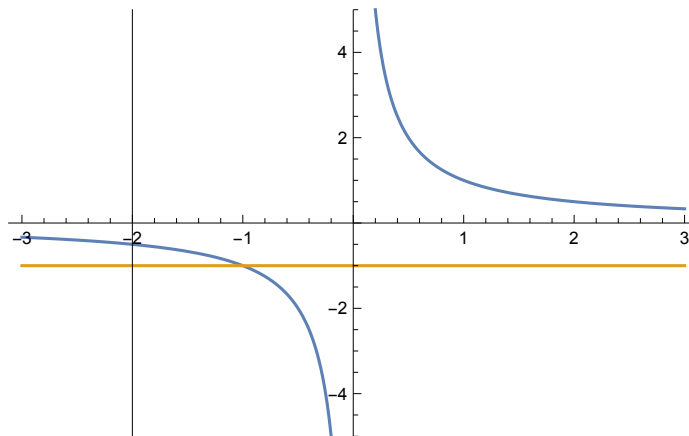
4. Find the volume of the solid obtained by rotating about the x-axis the region bounded by $y = e^{-x}$ and the x-axis for $0 \le x \le 2$.

5. Find the limit if it exists.

    5.1. $\lim_{x \to 0} \frac{x - \sin(x)}{x^3}$

    5.2. $\lim_{x \to 0^+} \left(\frac{1}{x}\right)^{\sin(x)}$