MATH 1951 Concept List for Midterm 1

Here is a rough list of concepts which we've covered in class, and which could appear on Midterm 1. I do not promise that this list is absolutely exhaustive; there may be subconcepts which I am not specifically listing. But this contains all of the important topics, and should be useful as a study aid.

• Limits: you should be able to compute limits either from a provided graph or via algebraic means. This includes
  • one-sided limits
  • limits as $x \to \infty$ or $x \to -\infty$; know that these limits give the horizontal asymptotes of the graph $y = f(x)$

• Continuity: you should know how to check whether or not a function is continuous (either usual or one-sided) at a certain value of x either by looking at a supplied graph or by using the definition of continuity.

• Intermediate Value Theorem: you should know how to use the IVT to show that there is a solution to an equation $f(x) = N$; this will usually be done in the case $N = 0$ to show that f has a root (as on Quiz 2)

• Derivatives: you should know the various interpretations of the derivative $f'(x)$ of a function $f(x)$. These include
  • the slope of a tangent line
  • the velocity of an object, if $f(x)$ represents the position of an object
  • the rate of change of $f(x)$

• Derivatives: you should know how to compute derivatives, by using either
  • the definition of the derivative as a limit
  • the various rules we've learned for computing derivatives (Power Rule, Constant Multiple Rule, Sum and Difference Rules, Product Rule, Quotient Rule, $(e^x)' = e^x$, $(\sin x)' = \cos x$, and $(\cos x)' = -\sin x$)

• You should be able to check whether or not a function is differentiable (i.e. has a derivative) at a certain value of x, either by looking at a supplied graph or by using the definition of the derivative.