

## MAT 265 TEST 1 Review

**1.1-1.2** (considered review) Know the definition of a function. Be able to interpret the function if it is given algebraically, numerically or graphically. Review **piecewise given functions** and basic function properties such as symmetries, even and odd properties, and increasing and decreasing properties. Review function transformations and know their effect on the graph of a function. Understand the composition of functions. Know the properties of the following families of functions: linear functions, power functions, polynomial functions, rational functions and trigonometric functions.

**1.3** Know the intuitive definition of the limit of a function at a point  $a$ . Be able to find **limits graphically and numerically**. Be able to find right and left limits of a function at a given point.

**1.4** Be familiar with the various limit laws. Be able to apply them to a specific limit calculation. Know the **algebraic techniques** that help to find limits. Know and be able apply the **Squeeze theorem**.

**1.5** Know and understand the definition of **continuity** of a function for both a point  $a$  and for an interval  $[a,b]$  (remember the 3 conditions). Be able to decide if a function is continuous if the graph or the formula of the function is given. Be familiar with the Theorems that follow from the limit laws. Know how to use continuity to evaluate limits (we called it the substitution property). Be able to determine the points where a function has **discontinuities** and if the discontinuity is removable, be able to remove it. Know and be able apply the **Intermediate Value Theorem** to determine if a function has roots in a given interval.

**1.6** Be able to find **limits involving infinity**. Know the intuitive definition of the **limit of a function at infinity**. Be able to find such limits algebraically, graphically and numerically. Know what a **vertical and a horizontal asymptote** of a function are and how to find them using limits. Know how to graph polynomial and rational functions using these limits and asymptotes.

**2.1** Know the **definition of the derivative** and be able to find derivatives using the definition. Be able to compute average and instantaneous rates of change and know the difference between the two. Be able to find the equation of the tangent line at a given point. Understand the meaning of the derivative at a point and as a function and be able to interpret derivatives in the context of real world applications.

**2.2** Know what it means for a **function to be differentiable** at a point and over an interval. Be able to determine points or intervals where a

function is not differentiable and be able to give justify why the **function is not differentiable**. Be able to **draw graphs of derivative functions** from the graph of a function. Understand the definition for higher order derivatives.

**2.3** Know the **basic rules for derivatives** and be able to apply them to find derivatives of given functions.