



Intro to Calculus - Unit D - Using Calculus to Sketch Curves

Unit Focus

Students will use methods of calculus to determine critical points, points of local and absolute extrema, intervals of increasing and/or decreasing, points of inflection, and intervals of concavity. Together with material already covered (such as x and y intercept(s), vertical and/or horizontal, and/or slant asymptotes, etc) they will draw clear sketches of graphs without using the graphing calculator. In addition, linear approximations and L'Hopital's Rule are covered. Students are given time throughout the unit to work with peers to solve problems.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core Mathematics: 9-12 - Define appropriate quantities for the purpose of descriptive modeling. (CCSS.MATH.CONTENT.HSN.Q.A.2) - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (CCSS.MATH.CONTENT.HSN.Q.A.3) - Interpret expressions that represent a quantity in terms of its context. (CCSS.MATH.CONTENT.HSA.SSE.A.1) - Model with mathematics. (CCSS.MATH.MP.4) - Use appropriate tools strategically. (CCSS.MATH.MP.5) - Look for and make use of structure. (CCSS.MATH.MP.7) Madison Public Schools Profile of a Graduate - Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2) - Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. (POG.3.1)	<i>Students will be able to independently use their learning to...</i> T1 manipulate equations/expressions or objects to create order and establish relationships. T2 draw conclusions about graphs, shapes, equations, or objects.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Mathematicians argue the relationships between problem scenarios and mathematical representation. U2 Mathematicians examine relationships to discern a pattern, generalizations, or structure. U3 Mathematicians analyze change and make predictions in various contexts.	<i>Students will keep considering...</i> Q1 What math tools/models/ strategies can I use to solve the problem? Q2 How can a variable/ expression / equation/graph tell a story? Q3 How can change be described? Q4 How can I break a problem down into manageable parts?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 when L'Hopital's Rule is appropriate to determine a limit K2 the 1st derivative test K3 the 2nd derivative test K4 Vocabulary: local and absolute maximum, local and absolute minimum, extrema, bounded, critical number,	<i>Students will be skilled at...</i> S1 curve sketching S2 using L'Hopital's Rule to find a derivative S3 finding linear approximations S4 determining local and/or absolute extrema S5 finding a window for a complete graph on graphing calculator

Stage 1: Desired Results - Key Understandings

increasing function, decreasing function, point of inflection, concavity

S6 using derivatives and critical numbers to determine the shape of a curve (whether it is increasing or decreasing, turning, etc.)

S7 using the 2nd derivative test to determine points of inflection and concavity

S8 using calculus concepts from this unit to sketch polynomial, rational, exponential, trigonometric and radical functions.