Unit 2: Sections 3.4 - 4.4 Skill Set

Section 3.4: Derivatives of Trigonometric Functions

Assessment Item	Correlated MML Problems	Textbook
Evaluate a limit involving (sin x)/x or (cos x – 1)/x.	7, 10, 11, 13, 39	9
Differentiate a function involving trigonometric functions.	15, 19, 22, 27, 45	17, 24, 28, 34, 48
Evaluate a limit involving a trigonometric function.	43	41, 42
Find the tangents to a curve at a given point. Then, graph the curve and the tangent line on the same set of axes.	50	51
Determine if and where a graph has a tangent line of given slope.		54, 55
Determine the value of a constant for which a function is continuous at a given input.	65	64

Additional Suggested Problems: 1, 3, 6, 37, 56, 58, 61, 67, 68

Section 3.5: Derivatives as Rates of Change

Assessment Item	Correlated MML Problems	Textbook
Solve and interpret a rate of change application.	9, 17, 28, 29	27, 30
Graph a position function. Find and graph the associated velocity function and interpret positive and negative movement. Evaluate the associated velocity and acceleration functions at a given time value.	11, 15	13

Additional Suggested Problems: 1, 4, 5, 25, 37, 47, 49

Section 3.6: The Chain Rule

Assessment Item	Correlated MML Problems	Textbook
Use the Chain Rule to differentiate a composite function.	9, 16, 17, 20, 25, 37, 39	7, 10, 13, 15, 18, 27, (29, 30), 51
Write a composite function in the form of its two (composing) functions.		29, 30
Given values for functions and their derivatives at a point, find the value of a derivative at that given point.	31, 61	
Find the tangents to a curve at a given point.	57, 59	

Additional Suggested Problems: 2, 4, 5, 6, 45, 47, 53, 54, 65, 69, 71

Section 3.7: Implicit Differentiation

Assessment Item	Correlated MML Problems	Textbook
Use implicit differentiation to find dy/dx. (first derivative = rate of change)	5a, 9a, 11, 15	7a, 19, 37
Use implicit differentiation to find the slope of the tangent line to a curve at a point.	5b, 9b	7b, 41, 44
Verify that the given point lies on the curve. Then, determine the equation of the line tangent to the curve at the given point.	21, 23	26
Use implicit differentiation to find the second derivative.	28	31
Find the lines that are tangent and/or normal to a curve at a given point.	49, 61	59, 64, 65

Additional Suggested Problems: 1, 2, 47, 51, 52, 67

Section 3.8: Related Rates

Assessment Item	Correlated MML Problems	Textbook
Solve applications involving related rates using the problem strategy on p. 167.	5, 7, 17, 21, 31	9, 19, 22, 23, 26, 27, 29

Additional Suggested Problems: 11, 20, 33, 37, 38

Section 4.1: Maxima and Minima

Assessment Item	Correlated MML Problems	Textbook
Find extreme values and where they occur given a graph.	11, 13, 17	15
Sketch a graph with the given properties.	19	21
Find the critical points of a function and determine the local extreme values.	25	23, 27, 29
Find the absolute extrema of a function on a given interval and where they occur.	33, 36	31, 37, 39
Solve applications by finding extreme values.	41	44, 64

Additional Suggested Problems: 1, 2, 3, 4, 5, 6, 7, 8, 45, 46, 47, 51, 52, 65, 68

Section 4.2: What Derivatives Tell Us

Assessment Item	Correlated MML Problems	Textbook
Given the graphs or conditions of the first and/or second derivative, sketch a graph of the function.	11, 13, 39, 41, 65	14, 15, 59
Find the intervals on which a function is increasing or decreasing.	17, 20, 25	23, 27
Find the critical points of a function and determine any local extreme values and where they occur.	31	29, 51, 55
Locate and identify the absolute extreme values of a function.		35
Find the intervals on which a function is concave up or concave down and identify and inflection points.	43, 45, 48	46
Match graphs with a function, its derivative, and its second derivative. Explain reasoning.	61	62
Given the graph of the first derivative of a function, find intervals of increase/decrease, intervals of concave up/concave down, critical points, local extrema, and inflection points. Sketch the corresponding graph of the second derivative and a possible graph of the original function.	67	

Additional Suggested Problems: 3, 5, 6, 8, 9, 57, 68

Section 4.3: Graphing Functions

Assessment Item	Correlated MML Problems	Textbook
Given the graphs or conditions of the first and/or second derivative, sketch a graph of the function.	8	7
Use the steps of the graphing procedure on p. 200 – 201 to graph an equation including coordinates of local extrema, inflection points, and x- and y-intercepts.	9, 11, 17, 23, 24	15, 18, 41
Given the first derivative of a continuous function, sketch the general shape of the function.	34, 35	36
Given the graph of the first and second derivatives of a function, find intervals of increase/decrease, intervals of concave up/concave down, critical points, local extrema, and inflection points. Sketch the corresponding graph of the original function.	39	38

Additional Suggested Problems: 3, 4, 33, 43, 44, 45, 46

Section 4.4: Optimization Problems

Assessment Item	**Correlated MML Problems**	**Textbook**
Solve applied optimization problems. (Model a situation with an equation, find the appropriate absolute extreme providing work necessary to support the result, and interpret in the context of the problem.)	7, 9, 11, 12, 15, 23	5, 9, 10ab, 13, 19, 26ab, 28, 46

Additional Suggested Problems: 3, 4, 6, 8, 24, 25, 26c, 51, 54a