Section	Learning Objectives	Suggested Textbook problems*
1.1 MODELS AND FUNCTIONS	• Identify four representations of a function. • Specify input and output variables, input and output desciptions, and input and output units. • Draw an input/output diagram and a graph from a completely defined model. • Determine whether a relation is a function. • Use function notation for a sentence. • Write a sentence of interpretation from function notation. • Evaluate (find output) of an equation using a TI-84$^+$ calculator. • Solve (find input) of an equation using a TI-84$^+$ calculator.	Pg. 8-12 1, 2, 5, 7, 13,17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 46, 47 *Note: Some of the suggested textbook problems are discussed in the Lecture and Note-taking Guide.
1.2: FUNCTION BEHAVIOR AND END BEHAVIOR LIMITS	• Use a graph to visually determine the input interval on which a function is increasing, decreasing, or constant, concave up, or concave down. • Identify inflection point(s) visually. • Numerically estimate end behavior of a function. • Use limit notation to describe end behavior of a function • Write equation(s) of horizontal asymptotes.	Pg. 19-22 1, 3, 4, 9-11, 12, 13, 15, 16, 21, 22, 25ab
1.3: LIMITS AND CONTINUITY	• Visually determine continuity of a function. • Use right-hand and left- hand limits to determine continuity of a function. • Numerically estimate behavior of a function at a vertical asymptote. • Use limit notation to describe a vertical asymptote. Write the equation of a vertical asymptote.	Pg. 30-31 1-6, 7, 8, 11, 13, 15, 16
1.4 LINEAR FUNCTIONS AND MODELS	• Find and interpret the rate of change (slope) and the starting value of a linear model (y-intercept). • Write a completely defined model with four elements. • Write a linear model given a starting value and slope. • Enter a data set into a TI-84$^+$ calculator. Graph the scatter plot and fit a linear equation. • Use a model for extrapolation and interpolation. Comment on the reliability of such predictions.	Pg. 42-45 3, 5, 7, 11, 13, 19, 21, 23, 25

1.5 EXPONENTIAL FUNCTIONS AND MODELS	• Determine whether an exponential function is increasing or decreasing by examining the equation. • Fit an exponential equation to a data set. • Find and interpret the percentage change for an exponential model. • Write an exponential model given a percentage change.	Pg. 53-56 3, 5, 9, 11, 13,15-17, 19-21
1.6 MODELS IN FINANCE	• Use the compound interest formulas $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$ to find future value. • Use the compound interest formulas $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$ to find present value. • Find the APY (annual percentage yield, effective rate) with compounding n times per year or continuously • Find and interpret the doubling time of an investment with compounding n times per year or continuously.	Pg. 64 1, 3, 7, 9, 11
1.7 CONSTRUCTED FUNCTIONS	• Construct new functions using addition, subtraction, multiplication, division, or composition. • Apply business terms to situations involving profit, revenue, cost, average cost, or the break-even point. • Use inverted data to write a model.	Pg. 72-75 5, 7, 9, 11, 13, 14, 15, 21, 23, 25, 27, 37
1.8 LOGARITHMIC FUNCTIONS AND MODELS	• Determine whether a logarithmic function is increasing or decreasing by examining the equation. • Recognize an inverse relationship between exponential and logarithmic functions. • Fit a logarithmic equation to a data set.	Pg. 81 – 86 1, 3,6, 7, 10, 11, 14, 15,17
1.9 QUADRATIC FUNCTIONS AND MODELS	• Fit a quadratic equation to a data set and completely define the model. • Differentiate between a quadratic and exponential data set using end behavior.	Pg. 91 – 93 3, 17-19
1.10 LOGISTIC FUNCTIONS AND MODELS	• Determine the type equation to fit a scatter plot based on its concavity. • Determine whether a logistic equation describes an increasing or decreasing function without graphing. Identify the upper limiting value of a logistic function from the equation. • Fit a logistic equation to a data set. • Write the equations of the two horizontal asymptotes of a logistic function . • Estimate the location of the inflection point of a logistic function. Interpret the inflection point of a logistic model in context.	Pg. 98 – 102 3, 5, 7, 9, 11, 13, 16, 17, 24

1.11 CUBIC FUNCTIONS AND MODELS	• Differentiate between a cubic and logistic data set using end behavior. • Model a data set using one of the six models. Support the choice of modeling equation.	Pg. 107 – 110 1, 5, 17, 19,21
2.1 MEASURES OF CHANGE OVER AN INTERVAL	• Use a verbal, graphic, numeric, or algebraic representation of a function to find change between two points. Write a sentence of interpretation. • Use a verbal, graphic, numeric, or algebraic representation of a function to find percentage change between two points. Write a sentence of interpretation. • Use a verbal, graphic, numeric, or algebraic representation of a function to find average rate of change between two points. Write a sentence of interpretation. • Relate the slope of the secant line drawn between two points on a graph to the average rate of change between two input values on the graph.	Pg. 134 – 138 5, 9, 11, 13, 15, 17
2.2 MEASURES OF CHANGE AT A POINT - GRAPHICAL	• Relate instantaneous rate of change to a tangent line. • Understand the relationship between secant and tangent lines and the relationship between their slopes. • Draw a tangent line using local linearity and the concavity of the graph. • Draw a tangent line at an inflection point. • Estimate and write a sentence of interpretation for the slope of a tangent line on a graph. • Determine relative steepness of a tangent line and whether its slope is positive, negative, zero, or undefined. • Find and interpret percentage rate of change in context.	Pg. 147 – 152 1, 2, 3, 9, 13-15, 17, 20, 25, 27
2.3 RATES OF CHANGE – NOTATION AND INTERPRETATION	• Use derivative notation. Attach units to derivatives given a context. • Interpret derivatives in context. • Sketch a possible graph of a function given some information about specific points, derivative values at specific points. • Find a derivative at a specified point by drawing a tangent line on a graph.	Pg. 157 – 159 1, 3, 5, 7, 11, 13, 14, 18
2.4 RATES OF CHANGE – NUMERICAL LIMITS AND NONEXISTENCE	• Find the derivative at a point using the numerical method. • Identify points at which the derivative does not exist due to discontinuity. • Identify points at which the derivative does not exist due to a vertical tangent.	Pg. 163 – 167 1, 3, 7, 12, 13, 15, 16-18, 20, 21

2.5 RATES OF CHANGE DEFINED OVER INTERVALS	• Use the limit definition of the derivative (algebraic method) to find the derivative formula for a (linear or quadratic) function. (Presentation may use 4-step method.) • Use a derivative formula to find a numeric derivative.	Pg. 172 – 174 1, 2, 9, 11, 13, 16
2.6 RATE-OF-CHANGE GRAPHS	• Visually locate intervals on the graph of a function where the slope is positive, negative, zero, or undefined. • Use estimates of the slopes of tangent lines to sketch a slope graph for a continuous function. • Visually locate points on the graph of a function where the slope fails to exist. • Sketch a slope graph for a function with a discontinuity or point in which the slope does not exist.	Pg. 180 – 184 1-4, 6, 8, 10, 14, 15, 22, 25
3.1 SIMPLE RATE-OF-CHANGE FORMULAS	• Use simple rate-of-change rules to write derivative formulas. • Write derivative model (roc model) using a function model.	Pg. 198 – 200 1- 27, 31-33, 38
3.2 EXPONENTIAL AND LOGARITHMIC RATE-OF-CHANGE FORMULAS	• Use the simple exponential and logarithmic differentiation rules.	Pg. 209 – 211 1, 3, 5, 7, 9, 11, 13, 22, 23, 29
3.3 RATES OF CHANGE FOR FUNCTIONS THAT CAN BE COMPOSED	• Use the chain rule (first form) to find the derivative of a composite function of two given equations, given in words, equations, numbers, or in the context of a problem statement • Use technology to find a numeric derivative (nderiv).	Pg. 216 – 219 1, 5, 6, 7, 9, 13, 19, 23
3.4 RATES OF CHANGE OF COMPOSITE FUNCTIONS	• Use the chain rule (second form) to find the derivative of a single equation (*which could be written as the composition of 2 functions)* • Identify an inside and an outside function of a composition function	Pg. 223 -225 1, 3, 5, 7, 9-11, 13, 15, 17, 19, 21, 25, 27, 28, 33, 35, 37, 38
3.5 RATES OF CHANGE FOR FUNCTIONS THAT CAN BE MULTIPLIED	• Use the product rule to find the derivative of $f(x) \cdot g(x)$ when given $f(x), f'(x), g(x),$ and $g'(x)$ as words, equations, numbers, or in the context of a problem statement • Use $\text{Revenue} = \text{Price} \cdot \text{Demand}$ in problem solving	Pg. 232 – 235 1, 3, 4, 6, 7, 11, 15, 17, 22, 23

3.6 RATES OF CHANGE OF PRODUCT FUNCTIONS	• Use the product rule when appropriate to find the derivative of an equation	Pg. 237 – 239 1, 4, 6, 7- 9, 11, 12, 15-17, 19, 20, 22, 25
4.1 LINEARIZATION AND ESTIMATES	• Use the slope of a tangent line to estimate the change in output between a point and a nearby point. • Use point and a tangent line to estimate the value of the function at a nearby point. Use the concavity of the graph to predict whether the estimate will be "high" or "low". • Write the linearization of a function.	Pg. 254 – 257 1, 3, 5, 7, 9, 10, 13, 15, 17
4.2 RELATIVE EXTREME POINTS	• Identify relative extreme points on a closed interval given either an equation or a graph. • Sketch the graph of a function given characteristics of the function.	Pg. 264 – 266 1- 5, 7, 9, 11, 12, 15, 17, 23, 25, 27, 30
4.3 ABSOLUTE EXTREME POINTS	• Identify absolute extreme points on a closed interval given either an equation or a graph. • Model a data set and find an absolute maximum or minimum (*if it exists*)	Pg. 271 – 273 1- 6, 9, 11, 13, 15
4.4 INFLECTION POINTS AND SECOND DERIVATIVES	• Find inflection points for a continuous, smooth function on a closed interval. • Classify an inflection point as the point of most/least rapid increase/decrease. • Identify inflection points on a closed interval, and give an interpretation in context. • Discuss the relation between the second derivative, concavity, and inflection points for a smooth function on a closed interval. • Given a function *f(x)*, sketch the graph of *f(x), f'(x) and f''(x)*. Be able to discuss what the graphs of *f'(x)* and *f''(x)* tell you about the graph of *f*(x).	Pg. 280 – 283 2, 3, 4, 6, 9, 11, 13, 15, 19, 20, 27, 28, 31, 35, 37
4.5 MARGINAL ANALYSIS	• Find and interpret marginal revenue, cost, or profit at a point when given the derivative at that point or given the revenue, cost, or profit function. • Find and use a model from a data set to interpret marginal values.	Pg. 288 – 290 1, 3, 7, 9, 15. 16, 17