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El Monte Union High School District Course Outline

Course Title:

Department:

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3- Material of Instruction

a. Text

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b. Supplemental Materials and Resources

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4- Course Objectives

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5- Standards (the College Board has grouped the concepts of calculus into four big ideas)

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b. Big Idea 2: Derivatives

Enduring Understanding **Understanding 2** **Learning Objective**

LO 2.1A (Students will be able to understand the derivative of a function at a point.) **LO 2.1B** (Students will be able to understand the derivative of a function at a point.) **LO 2.1C** (Students will be able to understand the derivative of a function at a point.)

LO 2.1A The derivative of a function f at a point a is the limit of the difference quotient $\frac{f(a+h)-f(a)}{h}$ as h approaches 0, provided that the limit exists. These are notations for the derivative of the derivative of a function f at a point a .

LO 2.1B The derivative of a function f at a point a is the limit of the difference quotient $\frac{f(a+h)-f(a)}{h}$ as h approaches 0, provided that the limit exists. These are notations for the derivative of the derivative of a function f at a point a .

LO 2.1C The derivative of a function f at a point a is the limit of the difference quotient $\frac{f(a+h)-f(a)}{h}$ as h approaches 0, provided that the limit exists. These are notations for the derivative of the derivative of a function f at a point a .

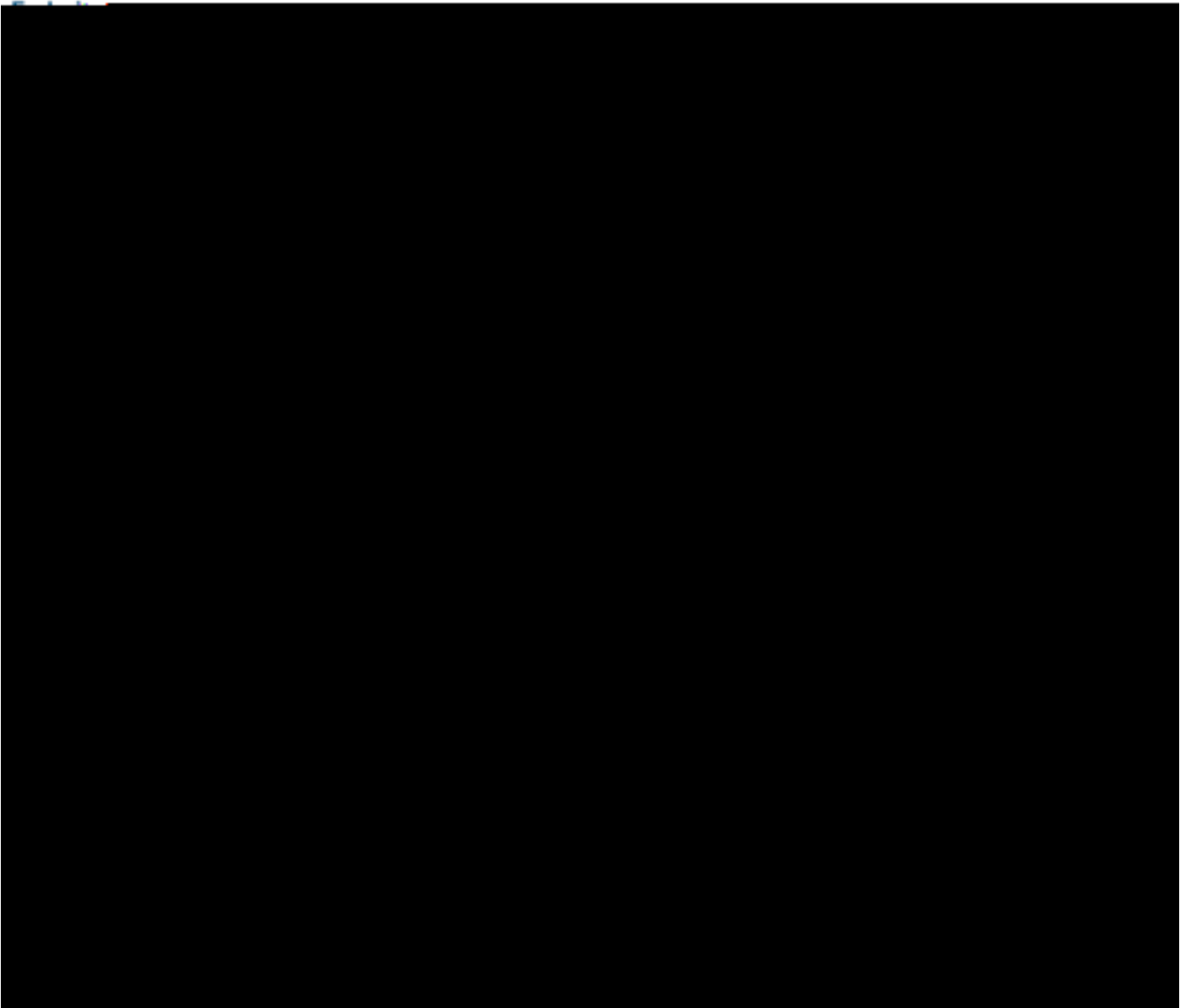
EK 2.1A3: The derivative of f is the function who at a in, $\lim_{h \rightarrow 0} \frac{f(a+h)-f(a)}{h}$ provided this limit exists.

EK 2.1A4: For $y = f(x)$, notations for the derivative include $\frac{dy}{dx}$, $f'(x)$, and y' .

EK 2.1A5: The derivative of a function f at a point a can be represented graphically, numerically, analytically, and verbally.

LO 2.1B: Estimate **EK 2.1B1:** The derivative of a function f at a point a can be represented graphically, numerically, analytically, and verbally.

c. Big Idea 3: Integrals and the Fundamental Theorem of Calculus



d. Big Idea 4: Series

Enduring Understanding

Learning Objectives

(Student will understand that...)

(Student will be able to...)

(Student will know that...)

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a. Big Idea 1: Limits**2. Limits and Continuity** $\Leftrightarrow \lim_{x \rightarrow 0} f(x) = L$: $\lim_{x \rightarrow 0} f(x) = L$

- 2.1 Rates of Change and Limits
- 2.2 Limits Involving Infinity
- 2.3 Continuity
- 2.4 Rates of Change and Tangent Lines

b. Big Idea 2: Derivatives**3. Derivatives** $\Leftrightarrow \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = f'(x)$: $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = f'(x)$

- 3.1 Derivative of a Function
- 3.2 Differentiability
- 3.3 Rules for Differentiation
- 3.4 Velocity and Other Rates of Change
- 3.5 Derivatives of Trigonometric Functions
- 3.6 Chain Rule
- 3.7 Implicit Differentiation
- 3.8 Derivatives of Inverse Trigonometric Functions
- 3.9 Derivatives of Exponential and Logarithmic Functions

4. Applications of Derivatives $\Leftrightarrow \lim_{x \rightarrow 0} \frac{f(x) - f(0)}{x} = f'(0)$: $\lim_{x \rightarrow 0} \frac{f(x) - f(0)}{x} = f'(0)$

- 4.1 Extreme Values of Functions
- 4.2 Mean Value Theorem
- 4.3 Connecting f' with f'' with the Graph of f
- 4.4 Modeling and Optimization
- 4.5 Linearization
- 4.6 Related Rates

c. Big Idea 3: Integrals and the Fundamental Theorem of Calculus**5. The Definite Integral** $\Leftrightarrow \lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i^*) \Delta x = \int_a^b f(x) dx$: $\lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i^*) \Delta x = \int_a^b f(x) dx$

- 5.1 Estimating with Finite Sums
- 5.2 Definite Integrals
- 5.3 Definite Integrals and Antiderivatives
- 5.4 Fundamental Theorem of Calculus
- 5.5 Trapezoidal Rule

6. Differential Equations and Mathematical Modeling $\Leftrightarrow \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = f'(x)$: $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = f'(x)$ $\frac{dy}{dx} = f(x, y)$

- 6.1 Antiderivatives and Slope Fields & Euler' Method
- 6.2 Antiderivatives by Substitution
- 6.3 Antiderivatives and by Parts
- 6.4 Exponential Growth and Decay
- 6.5 Population Growth

7. **Applications of Definite Integrals** $\Leftrightarrow \&,8\%?0,>\#91>0 :>? : '\#@E"A(\#@5"AD'$

7.1 Integral as Net Change

7.2 Areas in the Plane

7.3 Volumes

7.4 Lengths of Curves

8. **Sequences, L'Hôpital's Rule, Improper Integrals** $\# \Leftrightarrow \&,8\%?0,>\#91>0 :>? : '\#@I"A(\#BB"AD'$

8.1 L'Hôpital's Rule

8.2 Relative Rates of Growth

8.3 Improper Integrals

8.4 Partial Fractions and Integral Tables

10 **Parametric, Vector, and Polar Functions** $\<\$2, '\#, '\#0\%1\#>\#=>\&,8\%?0,>\#91>0 :>? : (\#J+1\#,1\#$

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10.1 Parametric Functions

10.2 Vectors in the Plane

10.3 Polar Functions

d. Big Idea 4: Series8. **Sequences, L'Hôpital's Rule, Improper Integrals"**

8.1 L'Hôpital's Rule

9. **Infinite Series** $\Leftrightarrow \&,8\%?0,>\#91>0 :>? : '\#BC"A(\#BE"A(\#BF"A(\#B5"A(\#BG"AD$

9.1 Power Series

9.2 Taylor Series

9.3 Taylor's Theorem

9.4 Radius of Convergence

9.5 Testing Convergence at Endpoints

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