School Year 2024/2025 Ms. Kane

Calculus BC Schedule--Unit 2/Chapter 2 Derivatives

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 0	*12-Aug*	*13-Aug*	*14-Aug*	*15-Aug*	*16-Aug*
Lesson	***1/2 DAY*** *Sophomores ONLY!!!*	*Syllabus & Rules*	Intro to Calculus	2.1 Rates of Change and the Derivative	2.2 The Derivative and Its Properties
HMWK	**No Additional Homework**	**HW1**--Practice Using Sapling Learning	**HW2**--Video on Definition of a Derivative OPEN HOUSE 5:30-7:30pm	**HW3**--p.168 #23,26,33,41 p.179 #13,15	**HW4**--p.171 AP Practice #4,6,8, p.181 #55,57,59, 63,67 p.182 AP Practice #2
Week 1	*19-Aug*	*20-Aug*	*21-Aug*	*22-Aug*	*23-Aug*
Lesson	2.3 Derivative of a Polynomial and e^x	2.3 Derivative of a Polynomial and e^x	**EARLY DISMISSAL** 2.2 Differentiability	2.2 Differentiability **Quiz 2.1, 2.2 & 2.3**	2.2 Differentiability
HMWK	**HW5**--p.190 #7,12, 14,25,35,37ab,43 p.193 AP Practice #1,4, Calculator #11	**HW6**--p.190 #45,47ace,51,74 Calculator p.190 #63, p.193 AP Practice #8, Video on Differentiability	**HW7**--p.179 #20,21,35,39,44 **Study for Quiz 2.1, 2.2 & 2.3**	**HW8**--p.179 #24,49,72, p.182 AP Practice #6,7,9	**HW9**--p.179 #25, 31,32,33,34,60, p.182 AP Practice #1,11
Week 2	*26-Aug*	*27-Aug*	*28-Aug*	*29-Aug*	*30-Aug*
Lesson	2.4 Differentiating the Product of Two Functions	2.4 Differentiating the Quotient of Two Functions	**EARLY DISMISSAL** 2.4 Differentiating Higher Order Derivatives	2.4 Differentiating Higher Order Derivatives **Quiz 2.2 & 2.4**	2.5 Derivative of Trigonometric Functions
HMWK	**HW10**--p.202 #9, 17,45,73ab,81a, 82c p.206 AP Practice #4	**HW11**--p.202 #23, 33,37,51,81c,82e, Video on Particle Motion	**HW12**--p.203 #57, 84,93abcd, p.207 AP Practice #6 **Study for Quiz 2.2 & 2.4**	**HW13**--Particle Motion Practice	**HW14**--p.212 #5, 15,19,31,45, Calculator #57
Week 3	*2-Sep*	*3-Sep*	*4-Sep*	*5-Sep*	*6-Sep*
Lesson	**NO SCHOOL** -- Labor Day	2.5 Derivative of Trigonometric Functions	**EARLY DISMISSAL** 9.2 Tangent Lines to Parametrics 9.5 Derivatives of a Vector Function	*Unit 2 REVIEW*	**Unit 2 TEST**
HMWK	**No Additional Homework**	**HW15**--p.668 AP Practice #1,3, p.214 AP Practice #2,3, 4,9 Video on Derivative of Vectors/Parametric	**HW16**--p.658 #2,3, 7,17,21,29 p.681 #3,57a p.687 #1,5a,24 p.689 AP Practice #3	**HW17**--p.217 #1b, 10,14,17,18,24,34, 55 62,67,74,76,77, p.699 #8a,39c,53	**No Additional Homework**

Week 4	*9-Sep*
Lesson	AP Activity: Unit 2
HMWK	*AP Activity: Unit 2 due Sep 16*

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UNIT 2: Differentiation

CHA-2
Derivatives allow us to determine rates of change at an instant by applying limits to knowledge about rates of change over intervals.

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
CHA-2.A Determine average rates of change using difference quotients.	**CHA-2.A.1** The difference quotients $\frac{f(a+h)-f(a)}{h}$ and $\frac{f(x)-f(a)}{x-a}$ express the average rate of change of a function over an interval.
CHA-2.B Represent the derivative of a function as the limit of a difference quotient.	**CHA-2.B.1** The instantaneous rate of change of a function at $x=a$ can be expressed by $\lim_{h\to 0}\frac{f(a+h)-f(a)}{h}$ or $\lim_{x\to a}\frac{f(x)-f(a)}{x-a}$, provided the limit exists. These are equivalent forms of the definition of the derivative and are denoted $f'(a)$.
CHA-2.B Represent the derivative of a function as the limit of a difference quotient.	**CHA-2.B.2** The derivative of f is the function whose value at x is $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$, provided this limit exists. **CHA-2.B.3** For $y=f(x)$, notations for the derivative include $\frac{dy}{dx}$, $f'(x)$, and y'. **CHA-2.B.4** The derivative can be represented graphically, numerically, analytically, and verbally.
CHA-2.C Determine the equation of a line tangent to a curve at a given point.	**CHA-2.C.1** The derivative of a function at a point is the slope of the line tangent to a graph of the function at that point.
CHA-2.D Estimate derivatives.	**CHA-2.D.1** The derivative at a point can be estimated from information given in tables or graphs. **CHA-2.D.2** Technology can be used to calculate or estimate the value of a derivative of a function at a point.

FUN-3
Recognizing opportunities to apply derivative rules can simplify differentiation.

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
FUN-3.A Calculate derivatives of familiar functions.	**FUN-3.A.1** Direct application of the definition of the derivative and specific rules can be used to calculate the derivative for functions of the form $f(x)=x^r$.
FUN-3.A Calculate derivatives of familiar functions.	**FUN-3.A.2** Sums, differences, and constant multiples of functions can be differentiated using derivative rules. **FUN-3.A.3** The power rule combined with sum, difference, and constant multiple properties can be used to find the derivatives for polynomial functions.
FUN-3.A Calculate derivatives of familiar functions.	**FUN-3.A.4** Specific rules can be used to find the derivatives for sine, cosine, exponential, and logarithmic functions.
FUN-3.B Calculate derivatives of products and quotients of differentiable functions.	**FUN-3.B.1** Derivatives of products of differentiable functions can be found using the product rule.
FUN-3.B Calculate derivatives of products and quotients of differentiable functions.	**FUN-3.B.2** Derivatives of quotients of differentiable functions can be found using the quotient rule.
FUN-3.B Calculate derivatives of products and quotients of differentiable functions.	**FUN-3.B.3** Rearranging tangent, cotangent, secant, and cosecant functions using identities allows differentiation using derivative rules.
FUN-3.F Determine higher order derivatives of a function.	**FUN-3.F.1** Differentiating f' produces the second derivative f'', provided the derivative of f' exists; repeating this process produces higher-order derivatives of f. **FUN-3.F.2** Higher-order derivatives are represented with a variety of notations. For $y=f(x)$, notations for the second derivative include $\frac{d^2y}{dx^2}$, $f''(x)$, and y''. Higher-order derivatives can be denoted $\frac{d^ny}{dx^n}$ or $f^{(n)}(x)$.

FUN-2
Recognizing that a function's derivative may also be a function allows us to develop knowledge about the related behaviors of both.

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
FUN-2.A Explain the relationship between differentiability and continuity.	**FUN-2.A.1** If a function is differentiable at a point, then it is continuous at that point. In particular, if a point is not in the domain of f, then it is not in the domain of f'. **FUN-2.A.2** A continuous function may fail to be differentiable at a point in its domain.

FUN-8
Solving an initial value problem allows us to determine an expression for the position of a particle moving in the plane.

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
FUN-8.B Determine values for positions and rates of change in problems involving planar motion. BC ONLY	**FUN-8.B.1** Derivatives can be used to determine velocity, speed, and acceleration for a particle moving along a curve in the plane defined using parametric or vector-valued functions. BC ONLY **FUN-8.B.2** For a particle in planar motion over an interval of time, the definite integral of the velocity vector represents the particle's displacement (net change in position) over the interval of time, from which we might determine its position. The definite integral of speed represents the particle's total distance traveled over the interval of time. BC ONLY

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CHA-3
Derivatives allow us to solve real-world problems involving rates of change.

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
CHA-3.B Calculate rates of change in applied contexts.	**CHA-3.B.1** The derivative can be used to solve rectilinear motion problems involving position, speed, velocity, and acceleration.
CHA-3.G Calculate derivatives of parametric functions. **BC ONLY**	**CHA-3.G.1** Methods for calculating derivatives of real-valued functions can be extended to parametric functions. **BC ONLY** **CHA-3.G.2** For a curve defined parametrically, the value of $\frac{dy}{dx}$ at a point on the curve is the slope of the line tangent to the curve at that point. $\frac{dy}{dx}$, the slope of the line tangent to a curve defined using parametric equations, can be determined by dividing $\frac{dy}{dt}$ by $\frac{dx}{dt}$, provided $\frac{dx}{dt}$ does not equal zero. **BC ONLY**
CHA-3.G Calculate derivatives of parametric functions. **BC ONLY**	**CHA-3.G.3** $\frac{d^2y}{dx^2}$ can be calculated by dividing $\frac{d}{dt}\left(\frac{dy}{dx}\right)$ by $\frac{dx}{dt}$. **BC ONLY**
CHA-3.H Calculate derivatives of vector-valued functions. **BC ONLY**	**CHA-3.H.1** Methods for calculating derivatives of real-valued functions can be extended to vector-valued functions. **BC ONLY**

LIM-3
Reasoning with definitions, theorems, and properties can be used to determine a limit.

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
LIM-3.A Interpret a limit as a definition of a derivative.	**LIM-3.A.1** In some cases, recognizing an expression for the definition of the derivative of a function whose derivative is known offers a strategy for determining a limit.