Schedule for Checkpoints

Checkpoint	Date	LT's introduced
1	Sept 17	F.2, L.1
2	Sept 24	D.1, D.2
3	Oct 8	D.3, D.4, DC.1
4	Oct 22	DC.2, DC.3, DC.4, DA.1
5	Nov 2	DA.2, DA.3
6	Nov 16	DA.4
7	Nov 23	INT.1, INT.2, INT.3
8	Dec 2	INT.4
9	Dec 7	INT.5
10	Dec 10	none
11 (Final exam)	Dec 14	none

Rubrics

- F.1: I can evaluate functions given in different representations, find composites of functions, and determine the domain and range of a function. (*Assessed via the Functions Bootcamp assignment*)
- F.2: I can find the average rate of change of a function on an interval.
    - *Given*: 2-3 different functions in different representations along with some intervals.
    - *To do*: Compute the average rate of change of each function on the specified interval.
    - *Check given if*: All work and explanations are clear and correct, and no more than one mistake due to a simple error is present.
- L.1: (CORE) I can find the limit of a function at a point using numerical, graphical, and algebraic methods.
    - *Given*: 2-3 different functions in different representations.
    - *To do*: State the value of the limit of each function at different points.
    - *Check given if*: All answers are correct and explanation/work is clear and correct.
- D.1 (CORE): I can find the derivative of a function, both at a point and as a function, using the definition of the derivative.

    - *Given*: 1-2 functions
    - *To do*: Use the definition and limits to find the derivative of each function at a particular point, and as a formula.
    - *Check given if*: All limits are set up correctly, and no more than one mistake due to a simple error is present in the computation of the limits.

- D.2 (CORE): I can use derivative notation correctly, state the units of a derivative, estimate the value of a derivative using difference quotients, and correctly interpret the meaning of a derivative in context.

    - *Given*: 1-2 functions in formula, graph, or table formats along with units for the inputs.
    - *To do*: Identify the derivative by its notation; state the units of the derivative; use difference quotients to estimate derivative values; and either explain the meaning of the derivative or select a correct explanation from a list.
    - *Check given if*: All responses are mathematically correct and the reasoning is explained clearly and correctly.

- D.3 (CORE): Given information about f, f', or f'', I can correctly give information about f, f', or f'' and the increasing/decreasing behavior and concavity of f (and vice versa).

    - *Given*: Information (as a description or as a graph) of two of f, f', and f''.
    - *To do*: Give correct conclusions about the missing function (f, f', or f'') and about increasing/decreasing behavior and concavity of f.
    - On some forms of this Checkpoint item, the "Given" and "To do" may be switched.
    - *Check given if*: All conclusions drawn are correct and all reasoning is clearly explained.

- D.4: I can find the equation of the tangent line to a function at a point and use the tangent line to estimate values of the function.

    - *Given*: 1-2 functions as formulas or graphs along with a point for each function.
    - *To do*: Find the equation of the tangent line to the graph of each function at the given point, and use the tangent line to estimate unknown values of the functions.
    - *Check given if*: All tangent line equations are correct and reasoning is clearly explained, and no more than one mistake due to a simple error is present in the estimations.

- DC.1 (CORE): I can compute derivatives correctly for power, polynomial, and exponential functions and the sine and cosine functions, and basic combinations of these (constant multiples, sums, differences).

    - *Given*: 4-5 functions that are combinations of the above function types.
    - *To do:* Compute the derivative of each function using shortcuts.
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.

- DC.2 (CORE): I can compute derivatives correctly for products, quotients, and composites of functions.

    - *Given*: 3-4 functions that are products, quotients, or composites.
    - *To do:* Compute the derivative of each function using shortcuts.
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.

- DC.3: I can compute derivatives correctly using multiple rules in combination.

    - *Given*: 2-3 functions that are a mix of basic types.
    - *To do:* Compute the derivative of each function using shortcuts.
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.

- DC.4: I can compute the derivatives correctly for logarithmic, trigonometric, and inverse trigonometric functions.

    - *Given*: 3-4 functions that involve logarithmic, trigonometric, and/or inverse trigonometric functions
    - *To do:* Compute the derivative of each function using shortcuts.
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.

- DA.1 (CORE): I can find the critical values of a function, determine where the function is increasing and decreasing, and apply the First and Second Derivative Tests to classify the critical points as local extrema.

    - *Given*: A function in formula form
    - *To do:* Find all the critical values; find all the intervals where the function is increasing and decreasing; and state for each critical value whether it is a local minimum, local maximum, or neither. (All of this is to be done without graphs, just using derivative shortcuts and algebra.)
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.

- DA.2: I can determine the intervals of concavity of a function and find all of its points of inflection.

    - *Given*: A function in formula form
    - *To do:* Find all the intervals where the function is concave up and concave down; and state the values of the inflection points. (All of this is to be done without graphs, just using derivative shortcuts and algebra.)
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.

- DA.3: I can use the Extreme Value Theorem to find the absolute maximum and minimum values of a continuous function on a closed interval.

    - *Given*: A cotinuous function in formula form, and a closed interval
    - *To do:* Use the process in the Extreme Value Theorem to locate the absolute maximum and absolute minimum values of the function on the interval. (All of this is to be done without

graphs, just using derivative shortcuts and algebra.)
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.

- DA.4 (CORE): I can set up and use derivatives to solve applied optimization problems.
    - *Given:* An applied optimization problem (= problem where you are asked to find the "best" value of a quantity and a verbal setup for the problem)
    - *To do:* Set up and solve the problem, and show all work and explain all reasoning correctly and clearly.
    - *Check given if:* The problem setup is correct, the solution is correct, the answer is correct, and the explanation is clear.

- INT.1: I can calculate the area between curves, net change, and displacement using geometric formulas and Riemann sums.
    - *Given:* A pair of functions in either formula or graph form
    - *To do:* Use Riemann sums and/or geometric formulas to find the area between their graphs, the net change in each function on an interval, and (if a function describes velocity) the displacement of the moving object.
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.

- INT.2: I can explain the meaning of each part of the definition of the definite integral in terms of a graph, and interpret the definite integral in terms of areas, net change, and displacement.
    - *Given:* A definite integral of a function on an interval
    - *To do:* Explain in clear English the meaning of each symbol in the integral; and either state the meaning of the integral or choose a correct explanation from a list.
    - *Check given if:* All explanations are clear and correct.

- INT.3: I can evaluate a definite integral using geometric formulas and the Properties of the Definite Integral.
    - *Given*: The graph of a function whose graph is a combination of lines and circles, and/or a definite integral and its value.
    - *To do*: Evaluate 2-3 definite integrals of the graphed function using geometry and/or the value of related definite integrals using integral properties.
    - *Check given if:* All work is shown clearly and no more than one mistake due to a simple error is present.
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- INT.4 (CORE): I can evaluate a definite integral using the Fundamental Theorem of Calculus.
    - *Given*: 4-5 definite integrals of functions given in formula form.
    - *To do*: Use the Fundamental Theorem of Calculus to evaluate the exact value of each integral.
    - *Check given if*: All work is shown clearly and no more than one mistake due to a simple error is

present.

- INT.5 (CORE): I can correctly antidifferentiate basic functions and identify antiderivatives.
    - *Given:* 4-5 functions in formula form.
    - *To do*: Compute the most general antiderivative of each.
    - *Check given if*: All work is shown clearly and no more than one mistake due to a simple error is present.