Portfolio

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Purpose

Throughout this course, you will work through a few prompts and collect them together in a course portfolio. These prompts represent key topics in this course. As you progress through the course, you will add to this portfolio and also have an opportunity to go back and edit any previous responses. By the end of the term, you will have a portfolio of work that demonstrates your understanding of this course.

Assignment

This portfolio will be worth 100 points throughout the term. Each prompt will be given at the beginning of the course, but you will not be able to complete them until you progress through certain topics in the course. For any individual prompt, you can submit it for corrections and critiques, and you will receive feedback to assist you in editing your response.

Your response to each prompt should adhere to these guidelines:

- Each prompt will begin on a new page.
- The instructions for the prompt are written before any work is shown.
- Any computations are fully worked out without the aid of a calculator or computer.
- Any work that is unclear is justified with full sentences.
- The conclusion is written as the end of the response.
- Any values are given exactly, unless rounding is specifically asked for.
- Proper notation is always given.

Prompts

Prompt 1. Let $y = x^2$.

a. Draw a Cartesian plane. Label the axes, draw tick marks, and provide a scale.

b. Sketch the graph of $y = x^2$ on your Cartesian plane. Label your graph with the equation $y = x^2$.

c. Plot the two points $(1, 1)$ and $(3, 9)$. Draw the secant through those points and label it "secant line".

d. Find an equation of the secant line. Format your conclusion in slope-intercept form.

Prompt 2. Evaluate the limit or show that it does not exist. Explain in as much detail as possible how to proceed from step to step.

$$\lim_{x \to -1^+} \frac{|x+1|}{x^2 + 4x + 3}$$

Prompt 3. Evaluate the limit $\lim_{y \to \infty} \sqrt{\dfrac{4y+5}{5+9y}}$

Prompt 4. Let $g(t) = \sqrt{t}$. Use the limit definition of derivative to calculate $g'(t)$.

Prompt 5. Find $g'(y)$ if $g(y) = 16(2y^3 - \sqrt{y} + y^{-1})$.

Prompt 6. The curve $y = \dfrac{1}{1+x^2}$ is called a *Witch of Agnesi*. Find the equation of the line tangent to the Witch of Agnesi at the point $\left(1, \frac{1}{2}\right)$. Use Derivative Rules to evaluate your derivative.

Prompt 7. Find $\frac{dy}{dx}$ if $y = \sqrt{x + \sqrt{x}}$.

Prompt 8. Find the derivative of $f(x) = \log \sqrt[3]{e^x \arctan(x+1)}$.