MATH-241 Calculus I — Created by Pierre-O. Parisé
Worksheet 04 — Fall 2021, 22/10/2021

Last name: ______________________
First name: ______________________
Section: ______________________

Question:	1	2	Total
Points:	10	10	20
Score:			

Instructions: You must answer all the questions below and give your solutions to the TA at the end of the recitation. Write your solutions on a different sheet of paper. No late worksheet will be accepted.

Question 1 **(10 pts)**

Suppose that $f(0) = 2$, $g(2) = 5$, $h(0) = -1$, $f'(0) = -3$, $g'(2) = 4$, and $h'(0) = 4$.

(a) (5 points) If $F = g \circ f$, then find the value of $F'(0)$.

> **Solution:** For a), we use the chain rule to get $F'(0) = g'(f(0))f'(0) = g'(2)f'(0) = 4 \cdot (-3) = -12$.

(b) (5 points) If $H = 2f/h$, then find the value of $F'(0)$.

> **Solution:** For b), we use the quotient rule to get $H'(0) = 2\left(\frac{f'(0)h(0)-f(0)h'(0)}{h(0)^2}\right) = 22$.

Question 2 **(10 pts)**

A person would like to build a rectangular wall and paint it. The material available only garentees that the wall will have a perimeter of 200 foot. The cost of the painting is $10\$/ft^2$. What is the dimensions that will maximize his cost?

Solution: Let x and y be the width and the height of the wall. Then, we have $2x + 2y = 200$, or equivalently, $x + y = 100$. The cost function to optimize is $C = 10xy$ and so $C(x) = 10x(100 - x) = 1000x - 10x^2$. We compute the derivative to find out that $C'(x) = 1000 - 20x$ and so $C'(x) = 0$ if and only if $x = 50$. We wee that $C'(x) > 0$ if $x < 50$ and $C'(x) < 0$ if $x > 50$. So $x = 50$ is a absolute maximum. Finally, the dimensions of the wall that maximize the cost is $x = 50ft$ and $y = 50ft$.