Quiz

Directions: Carefully read each question below and answer to the best of your ability in the space provided. You **MUST** show your work to receive full credit!

1. (5 points) Let $H(x) = \left(x^3 + f(x)\right)^2$. Given that $f(2) = -1$ and $f'(2) = 4$, find $H'(2)$.

Solution: The problem is asking us to find $H'(2)$ this is a two part process (1) find $H'(x)$ and (2) evaluate $H'(x)$ at $x = 2$.

(1) Let us take a derivative of our function $H(x) = \left(x^3 + f(x)\right)^2$, which is using power and chain rules

$$H'(x) = 2\left(x^3 + f(x)\right)\left(3x^2 + f'(x)\right).$$

(2) And now, let's evaluate $H'(x)$ at $x = 2$, that is

$$\begin{aligned} H'(2) &= 2\left((2)^3 + f(2)\right)\left(3(2)^2 + f'(2)\right) \\ &= 2(8 + (-1))(12 + 4) \\ &= 224. \end{aligned}$$

2. (5 points) Suppose $f(x) = x^2 - 6x + 8$. Find the intervals on which $f(x)$ is increasing.

Solution: Remember that a function g is increasing on the interval where $g'(x) > 0$. Thus, we need to take a derivative of our function $f(x)$ first and then find a solution(interval) to the inequality $f'(x) > 0$. Let us take derivative of $f(x)$ first, that is

$$f'(x) = 2x - 6,$$

and now look at the inequality $f'(x) > 0$,

$$f'(x) > 0 \quad \Longleftrightarrow \quad 2x - 6 > 0 \quad \Longleftrightarrow \quad x > 3.$$

Thus, our function $f(x)$ is increasing on the interval $(3, +\infty)$ or simply when $x > 3$.

Name: _____

Section (circle one): 021 022 023 024

Question:	1	2	Total
Points:	5	5	10
Score:			