Name: _____

Signature: _____

Show all work *clearly* and in *order*, and $\boxed{\text{box your final answers.}}$ Justify your answers algebraically whenever possible. You have at most 80 minutes to take this 100 point exam, each question is worth 10 points. No cellular phones allowed.

1. Find the derivative, $f'(x)$, of the function using the rules.

$$f(x) = \frac{3+x}{1-3x}$$

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2. Find the derivative, $f'(x)$, of the function using the definition of the derivative.

$$f(x) = \frac{3+x}{1-3x}$$

3. Find the derivative, $f'(x)$, of the function using the rules.

$$f(x) = \sqrt{\frac{x-1}{x+1}}$$

4. Find the derivative, $f'(x)$, of the function using the rules.

$$f(x) = \sin^2\left(\cos x^2\right)$$

5. Find the derivative, $\frac{dy}{dx}$, of the relationship using the rules.

$$x^3 + x^2y - 4y^2 = 6$$

6. Find the domain: $f(x) = \sqrt{4 - 25x^2}$

7. Determine if $f(x)$ is even, odd, or neither: $\quad f(x) = 2x^5 - 3x^3 + 2$

8. Find, it's either a number, DNE, $+\infty$ or $-\infty$: $\displaystyle\lim_{x\to 0}\frac{\sqrt{x+4}-2}{x}=$

9. Using your calculator, estimate the limit by constructing a table of values. $\displaystyle\lim_{x \to 0} \frac{9^x - 5^x}{x} =$

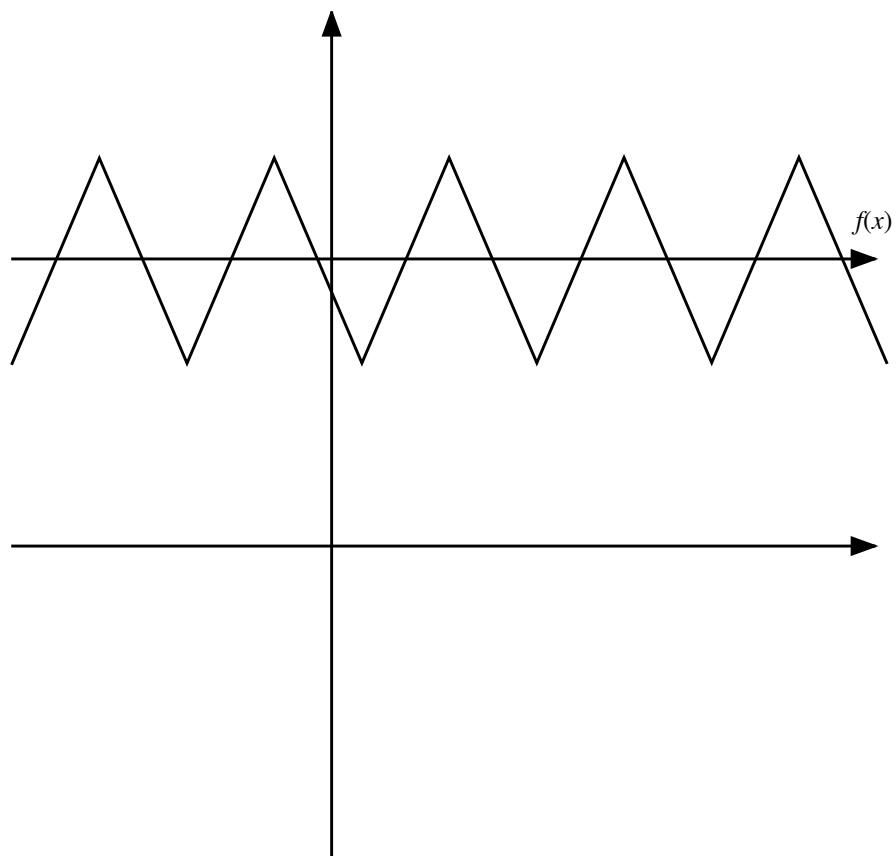10. Draw the derivative of $f(x)$ directly below the function.

Figure 1: Graph of $f(x)$ given, please graph of $f'(x)$ directly below.