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Mathematical Thinking
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Quiz 4

Answer all questions on this paper. Show your work.

1. Consider the function $f(x) = 4x^2 - 1$. Evaluate each of the following:

(a) $f(0)$

(b) $f(\sqrt{2})$

(c) $f(a^2)$ (assume a is an arbitrary number)

2. We can use functions to perform conversions between different temperature scales such as Celsius and Fahrenheit. For instance, if $c(f)$ is the function that takes as input a temperature in degrees Fahrenheit and returns as output the same temperature measured in degrees Celsius, then we know that $c(32) = 0$ and $c(212) = 100$, since $32^\circ\text{F} = 0^\circ\text{C}$ and $212^\circ\text{F} = 100^\circ\text{C}$.

Let's construct a similar function to convert from Fahrenheit into Kelvin, the temperature scale normally preferred by scientists. That is, we want a function $k(f)$ that takes as input temperature measurements in degrees Fahrenheit, and outputs the corresponding temperature measurements in degrees Kelvin:

$k(f)$ = the Kelvin temperature corresponding to a Fahrenheit temperature of f

The relation between Fahrenheit and Kelvin scales is determined by the following facts:

- $32^\circ\text{F} = 273^\circ\text{K}$
- $212^\circ\text{F} = 373^\circ\text{K}$
- k and f are *linearly related*, i.e. the graph of the function $k(f)$ is a line.

(a) Use these facts to write down an equation defining the function $k(f)$.

(b) What is 50°F when measured in degrees Kelvin?