Problem 1. On a recent trip to the Department of Motor Vehicles (DMV), I noticed a sign describing the fine for writing the DMV a bad check: one that is subsequently returned for insufficient funds in the bank account. The sign indicated that

- if the bad check was for $200.00 or less, there would be a $35.00 fine; and

- if the bad check was in excess of $200.00, the fine would be 15% of the total amount of the check.

Let $f(x)$ be the function whose value at x is the fine (in dollars) imposed on a bad check of x dollars.

(a) Complete the equation of this piece-wise defined function:

$$f(x) = \begin{cases} 35 & 0 < x < 200; \\ 35 & x = 200; \text{ and} \\ .15x & x > 200. \end{cases}$$

Note that the units of $f(x)$ are dollars.

(b) Is this function continuous at $x = 200$? Why or why not?

We need to check that $\lim_{x \to 200} f(x) = f(200)$. This is the same as checking that $\lim_{x \to 200^+} f(x) = \lim_{x \to 200^-} f(x) = f(200)$.

Note that $\lim_{x \to 200^+} f(x) = \lim_{x \to 200^+} .15x = 30$, but $f(200) = 35$. We conclude that f is not continuous at $x = 200$.