Infinite discontinuity

1 Consider $f(x) = (2x - 3)e^{\frac{1}{x}}$

a. State the domain of $f(x)$.

b. Investigate the continuity of $f(x)$.

c. The domain of $f(x)$ is $(-\infty\,;\,0) \cup (0\,;\,+\infty)$.

d. To determine the type of discontinuity evaluate the one-sided limits.
The limit of $f(x)$ as x approaches zero from the left is

$$\lim_{x \to 0^-} (2x - 3)e^{\frac{1}{x}} = -3e^{-\infty} = -3 \cdot 0^+ = 0^-$$

Now evaluate the limit of $f(x)$ as x approaches zero from the right.

$$\lim_{x \to 0^+} (2x - 3)e^{\frac{1}{x}} = -3e^{+\infty} = -3 \cdot (+\infty) = -\infty$$

Since $\lim_{x \to 0^+} f(x) = -\infty$, $f(x)$ has an *infinite discontinuity* at $x = 0$.

What does it mean?

One-sided limits Sono i due limiti di una funzione calcolati rispettivamente per x tendente a c^- e per x tendente a c^+

Infinite discontinuity Singolarità di seconda specie. È anche detta **essential discontinuity**, **discontinuity of the second kind**