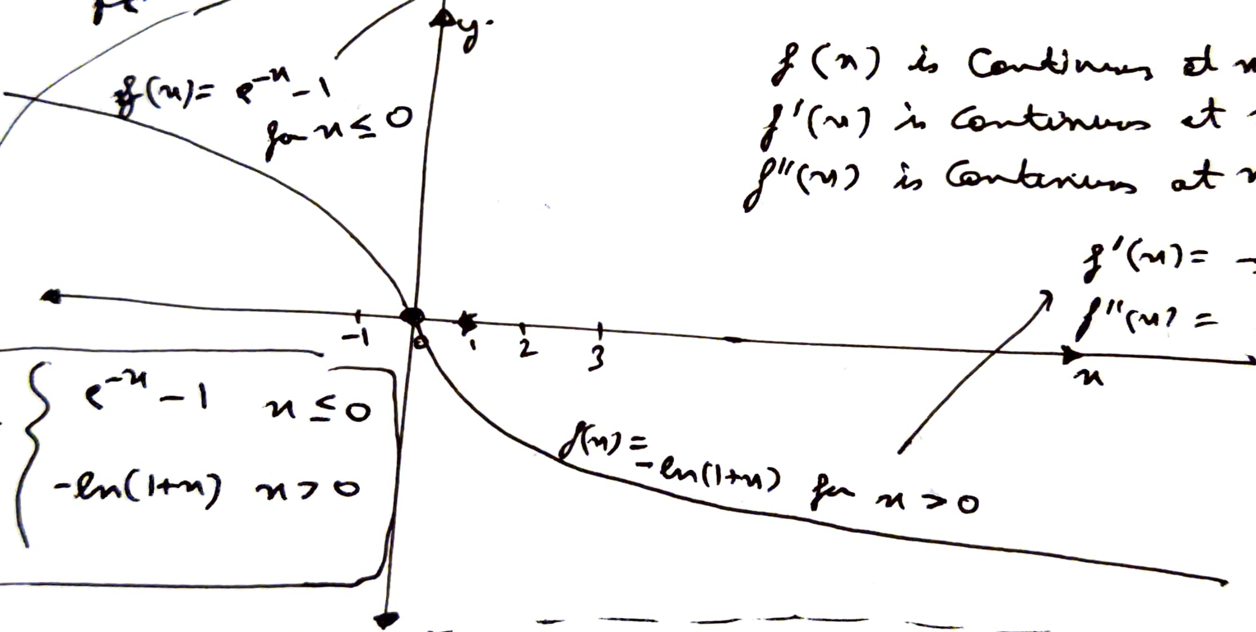
Q: Suppose a fn. $f: R \to R$ satisfies $f''(x) > 0 \ \forall x \in R$, is it necessarily bounded below?

Ans: No, this is a counterexample

$$f'(x) = -e^{-x}$$

$$f''(x) = e^{-x}$$



$f(x)$ is Continuous at $x=0$.

$f'(x)$ is Continuous at $x=0$.

$f''(x)$ is Continuous at $x=0$.

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

$$f''(x) = \frac{1}{(1+x)^2}$$

$$\boxed{f(x) = \begin{cases} e^{-x} - 1 & x \leq 0 \\ -\ln(1+x) & x > 0 \end{cases}}$$