QUESTION

Using l'Hopital's rule, or otherwise, evaluate $\lim_{x\to 0}\left(\frac{(1+x)^{\frac{1}{2}}-1}{x}\right)$.

ANSWER

$\lim_{x\to 0}\left(\frac{(1+x)^{\frac{1}{2}}-1}{x}\right) = \frac{1-1}{0} = \frac{0}{0}?$

$= \lim_{x\to 0}\left(\frac{\frac{1}{2}(1+x)^{-\frac{1}{2}}}{1}\right) = \frac{\frac{1}{2}(1)^{-\frac{1}{2}}}{1} = \frac{1}{2}$