Find the y' using the increment method $y=\sqrt{x-1}$ when $x=10$

a.) $y+\Delta y=\sqrt{x+\Delta x-1}$

b.) $\Delta y=\sqrt{x+\Delta x-1}-y$

c.) $\dfrac{\Delta y}{\Delta x}=\dfrac{\sqrt{x+\Delta x-1}-\sqrt{x-1}}{\Delta x}$

d.) $\lim\limits_{\Delta x\to 0}\dfrac{\Delta y}{\Delta x}=\lim\limits_{\Delta x\to 0}\dfrac{\sqrt{x+\Delta x-1}-\sqrt{x-1}}{\Delta x}$

$y'=\dfrac{\sqrt{x-1}-\sqrt{x-1}}{0}=\dfrac{0}{0}$ indeterminate form

$y'=\lim\limits_{\Delta x\to 0}\dfrac{\sqrt{x+\Delta x-1}-\sqrt{x-1}}{\Delta x}\cdot\dfrac{\sqrt{x+\Delta x-1}+\sqrt{x-1}}{\sqrt{x+\Delta x-1}+\sqrt{x-1}}$

$y'=\lim\limits_{\Delta x\to 0}\dfrac{(x+\Delta x-1)-(x-1)}{\Delta x\left(\sqrt{x+\Delta x-1}+\sqrt{x-1}\right)}$

$=\lim\limits_{\Delta x\to 0}\dfrac{\Delta x}{\Delta x\left(\sqrt{x+\Delta x-1}+\sqrt{x-1}\right)}$

$=\lim\limits_{\Delta x\to 0}\dfrac{1}{\sqrt{x+\Delta x-1}+\sqrt{x-1}}$

$=\dfrac{1}{\sqrt{x-1}+\sqrt{x-1}}=\dfrac{1}{2\sqrt{x-1}}$

when $x=10$

$=\dfrac{1}{2\sqrt{10-1}}$

$=\dfrac{1}{2(3)}$

$=\dfrac{1}{6}$