

HW#3 Due Jan 25, 2022

HW Find the 2nd-order derivative of $y = f(x) = 10 + \sqrt{x}$ and fill in the table:

Point	x	y	$f'(x)$	$f''(x)$
	0	10	—	—
A	1	11	0.5	$-\frac{1}{4}$
B	2	11.414	0.354	-0.088
C	3	11.732	0.288	-0.048

$$\begin{aligned}
 f'(x) &= 10 + x^{\frac{1}{2}} \\
 &= \frac{1}{2} x^{\frac{1}{2}-1} \\
 &= \frac{1}{2} x^{-\frac{1}{2}} \\
 &= \frac{1}{2} \cdot \frac{1}{\sqrt{x}} \\
 &= \frac{1}{2\sqrt{x}}
 \end{aligned}$$

$$\begin{aligned}
 f''(x) &= -\frac{1}{4} x^{-\frac{1}{2}-1} \\
 &= -\frac{1}{4} x^{-\frac{3}{2}} \\
 &= -\frac{1}{4} \cdot \frac{1}{x^{\frac{3}{2}}} \\
 &= -\frac{1}{4 \sqrt{x^3}} \\
 &= -\frac{1}{4x\sqrt{x}}
 \end{aligned}$$

$$\begin{aligned}
 x^{\frac{3}{2}} &= x^{\frac{2}{2}} \cdot x^{\frac{1}{2}} \\
 &= x \cdot \sqrt{x}
 \end{aligned}$$

Plot the graph of y and $f'(x)$. Is $f'(x)$ linear?

Graph of y

