$$O_{\text{pportunity}}$$

Instructions: Read each problem carefully. When in doubt, explain your answer thoroughly.

1. Find y':

$y = \cos(x\sqrt{x+1})$

$y^2 = \sin(xy)$

Find y:

$y' = \cos(2x)$, $y(\frac{\pi}{4}) = 1$

$y' = \frac{1}{x^2}$, $y'(-2) = 0$

2. If $f(x)$ is a positive, continuous function, then $\int_a^b f(x)\,dx$ gives the area under the curve $y = f(x)$ between $x = a$ and $x = b$. The precise definition is given in terms of a limit. Write a paragraph or two describing this definition.

3. State the Mean Value Theorem. Be sure to note the hypotheses of the theorem.

Does the function

$$f(x) = \begin{cases} x^2 & x \geq 1 \\ x & x < 1 \end{cases}$$

on the interval $[0, 2]$ satisfy the hypothesis of the MVT?