Quiz 3

1. Let $f(x) = \sqrt{x}$. Find $f'$ and $f''$.

2. Let $f(x) = (x + 1)e^x$. Find $f'$.

3. The figure shows the graphs of $f$, $f'$, and $f''$. Identify each curve. You do NOT need to explain your choices.
(1) \[ f(x) = \frac{3}{12} = \frac{1}{4} \]
\[
 f'(x) = \frac{4}{3} x^{\frac{1}{3}-1} = \frac{4}{3} x^{-\frac{2}{3}}
\]
\[
 f''(x) = \frac{4}{3} \left( -\frac{2}{3} \right) x^{-\frac{2}{3}-1} = -\frac{2}{9} x^{-\frac{5}{3}}
\]

(2) \[ f(x) = (x+1) e^x \]
\[
 f'(x) = (x+1)' e^x + (x+1) (e^x)'
\]
\[
 = 1 \cdot e^x + (x+1) e^x
\]
\[
 = (x+2) e^x
\]

(3) Based on the facts that
- derivative measures the rate of change of a function
- the rate of change is positive if the function is increasing, and is negative if the function is decreasing,
we conclude that
- the graph of \( f \) is \( c \),
- the graph of \( f' \) is \( a \),
- the graph of \( f'' \) is \( b \).