

Given $f(x) = x^5 - 3x^3 + 5$ find $(f^{-1})'(13)$.

$$x^5 - 3x^3 + 5 = 13 \rightarrow x = 2$$

Since $(2, 13)$ is on $f \rightarrow (f^{-1})'(13) = \frac{1}{f'(2)}$.

$$f'(x) = 5x^4 - 9x^2$$

$$f'(2) = 44$$

$$\therefore (f^{-1})'(13) = \frac{1}{44}$$

Show that $f(x) = \frac{3x-1}{2x+4}$ has an inverse.

$$f'(x) = \frac{7}{2(x+2)^2}$$

f has an inverse because

$$f'(x) \geq 0 \quad \forall x \text{ in } \underline{f}.$$

Given $f(x) = e^{5x+3}$, find $f^{-1}(x)$.

$$\text{let } y = f(x)$$

$$y = e^{5x+3}$$

$$\ln y = 5x + 3$$

$$5x + 3 = \ln y$$

$$x = \frac{-3 + \ln y}{5}$$

$$f^{-1}(y) = \frac{-3 + \ln y}{5}$$

$$\therefore f^{-1}(x) = \frac{-3 + \ln x}{5}$$