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

$f'(x) \geq 0 \ \forall x$ in f.

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

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

$$f'(2) = 44$$

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

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

✓ let $y = f(x)$

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

$\ln y = 5x - 3$

$\rightarrow 5x - 3 = \ln y$

✓ $5x = 3 + \ln y$

$\rightarrow x = \dfrac{3 + \ln y}{5}$

✓ $f^{-1}(y) = \dfrac{3 + \ln y}{5}$

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