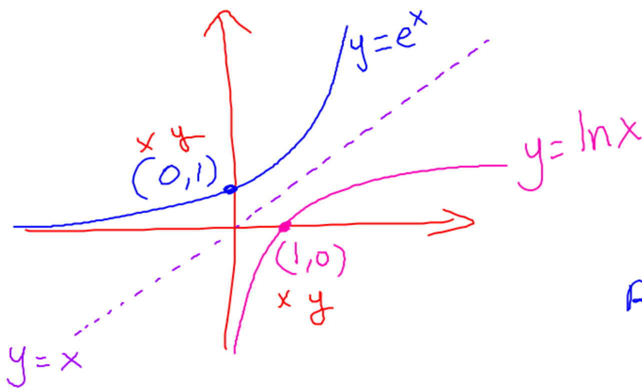
Section 1.5 Finding Inverse of functions.



	e^x	$\ln x$
D	$(-\infty,\infty)$	$(0,\infty)$
R	$(0,\infty)$	$(-\infty,\infty)$
Remarkable point	$(0,1)$ y-int	$(1,0)$ x-int.

e^x and $\ln x$ are symmetrical with respect to $y=x$.

To find the inverse of function f^{-1}

1. Solve for x
2. Switch the variables.

example: $f(x) = 2x+1$ $\qquad f^{-1}(x)$?

$$y = 2x+1$$
$$-1 \qquad -1$$
$$\frac{y-1}{2} = \frac{2x}{2}$$
$$\frac{y-1}{2} = x$$
$$x = \frac{y-1}{2}$$

$$x = \frac{y-1}{2}$$

switch the variables

$$y = \frac{x-1}{2}$$

$$f^{-1}(x) = \frac{x-1}{2}$$

Example 2 :

$\underbrace{f(x)} = \sqrt{x+2}$

$(y)^2 = (\sqrt{x+2})^2$

$y^2 = x+2$

$\quad -2 \qquad -2$

$y^2 - 2 = x$

$x = y^2 - 2$

switch variables

$y = x^2 - 2$

$f^{-1}(x) = x^2 - 2$

Example 3 :

$f(x) = x^3$

$f^{-1}(x)$?

$\sqrt[3]{y} = \sqrt[3]{x^3}$

$\sqrt[3]{y} = x$

$x = \sqrt[3]{y}$

$y = \sqrt[3]{x}$

$f^{-1}(x) = \sqrt[3]{x}$

$x = 2$

2^3

$f(x)$ 8

$f^{-1}(x)$ $\sqrt[3]{8}$

Example 4:

$$f(x) = \frac{x}{x+1}$$

$f^{-1}(x)$?

$$(x+1) \cdot \frac{y}{1} = \frac{x}{\cancel{x+1}} \cdot \cancel{(x+1)}$$

$$(x+1)y = x$$

$$xy + y = x$$

$$-x \qquad -x$$

$$xy - x + y = 0$$

$$-y \qquad -y$$

$$xy - x = -y$$

$$\frac{x(y-1)}{y-1} = \frac{-y}{y-1}$$

$$x = \frac{-y}{y-1}$$

switch variables

$$y = \frac{-x}{x-1}$$

$$\boxed{y = \frac{x}{1-x}}$$

$$f^{-1}(x) = \frac{x}{1-x}$$

<u>Hw:</u> p 126 # 13 – 22 .