

$$f(x) = \frac{x}{x-1} \quad g(x) = -4/x$$

$$\begin{aligned} f \circ g &= f(g(x)) \\ &= f\left(-\frac{4}{x}\right) \\ &= \frac{-\frac{4}{x}}{-\frac{4}{x}-1} \\ &= -\frac{4}{x} \cdot \frac{x}{-4-x} \\ &= \frac{4}{4+x} \end{aligned}$$

$$\begin{aligned} x &\neq 0 \\ x+4 &\neq 0 \\ x &\neq -4 \end{aligned}$$

$$D = \{x \neq 0, -4\}$$

$$(-\infty, -4) \cup (-4, 0) \cup (0, \infty)$$

$$\begin{aligned} g \circ f &= g(f(x)) \\ &= g\left(\frac{x}{x-1}\right) \quad \rightarrow x \neq 1 \\ &= \frac{-4/x}{x/x-1} \\ &= \frac{-4x+4}{x} \quad x \neq 0 \end{aligned}$$

$$D = \{x \neq 0, 1\}$$

x	H(x)
-1	1/4
0	1
1	4
2	16
3	64

Linear
 average
 rate of
 change

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{H(x_2) - H(x_1)}{x_2 - x_1}$$

$$\frac{-4 - 1}{1 - 0} = -5$$

$$= \frac{1 - 1/4}{0 + 1} = \frac{3}{4}$$

Exponential
 Ratio of
 consecutive outputs.

$$\frac{H(2)}{H(1)} = \frac{H(1)}{H(0)} = \frac{H(0)}{H(-1)}$$

$$\frac{16}{4} = \frac{4}{1} = \frac{1}{1/4}$$

$$4 = 4 = 4$$

$$H(x) = Ca^x$$

$$H(x) = e 4^x$$

$$H(0) = e 4^0$$

$$1 = e$$

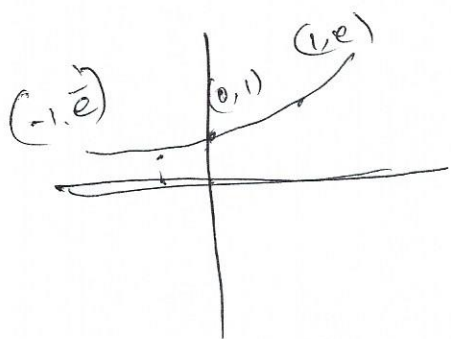
growth factor = Ratio of constant
constant.

6.4.

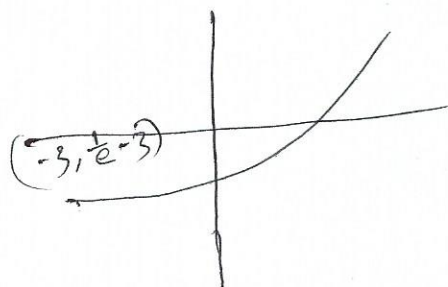
parent,
 $y = e^x$

$$f(x) = e^{x+2} - 3$$

→ left
→ increasing
→ axis-down



* multiply or divisions
with x. that is
stretching.



$$D: \mathbb{R}(-\infty, \infty)$$

$$R: (-3, \infty)$$

$$\text{Asym: } y = -3$$

Inverse

$$y = e^{x+2} - 3$$

$$x = e^{y+2} - 3$$

$$x + 3 = e^{y+2}$$

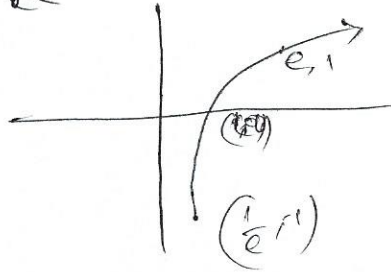
$$\ln(x+3) = \cancel{y+2} (y+2) \ln e$$

$$\ln(x+3) = y+2$$

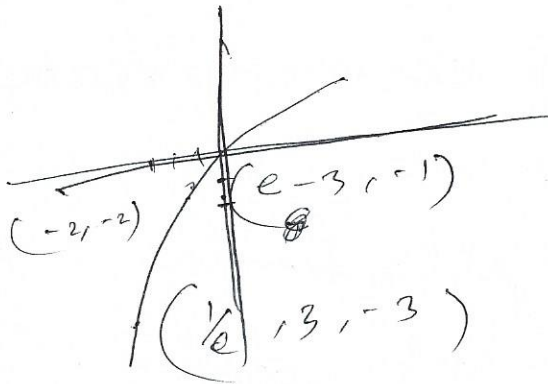
$$y = \ln(x+3) - 2$$

Parent function

$\ln x$



$D : (-3, \infty)$
 $R : \mathbb{R} \text{ (all } x)$
 $Asym : x = -3$



6.5.

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$$\ln \frac{5n \sqrt{1+3n}}{(n-4)^3} \quad n > 4$$

$$= \ln 5n + \ln \sqrt{1+3n} - 3 \ln (n-4)$$

$$= \ln 5n + \frac{1}{2} \ln (1+3n) - 3 \ln (n-4)$$

6.6

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$$5(2^{3n}) = 8$$

$$2^{3n} = 2^{3/5}$$

$$3n \log_2 2 = \log_2 8/5$$

$$3n = 3 \log_2 2 - \log_2 5$$

$$n = 1 - \frac{1}{3} \log_2 5 = 1 - \frac{1}{3} \left(\frac{\ln 5}{\ln 2} \right)$$

$$= 1 - \log_2 \sqrt[3]{5}$$