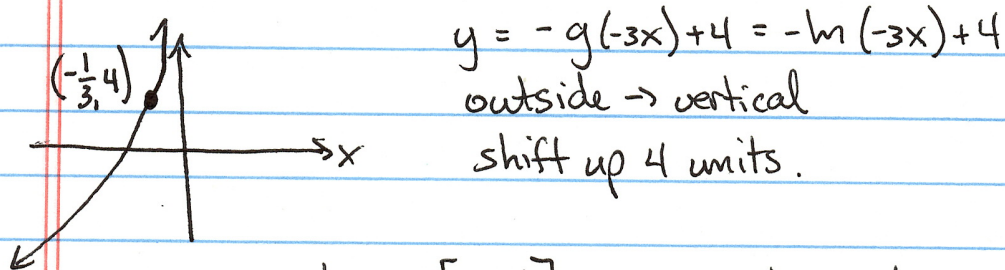
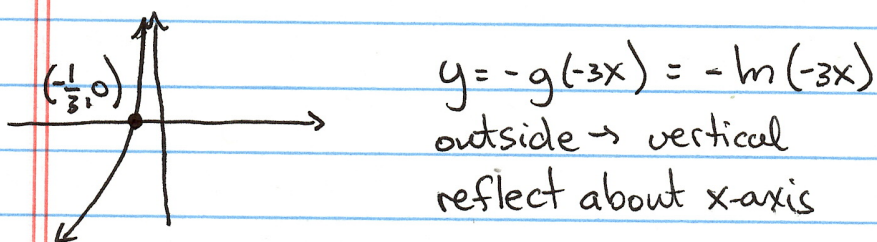
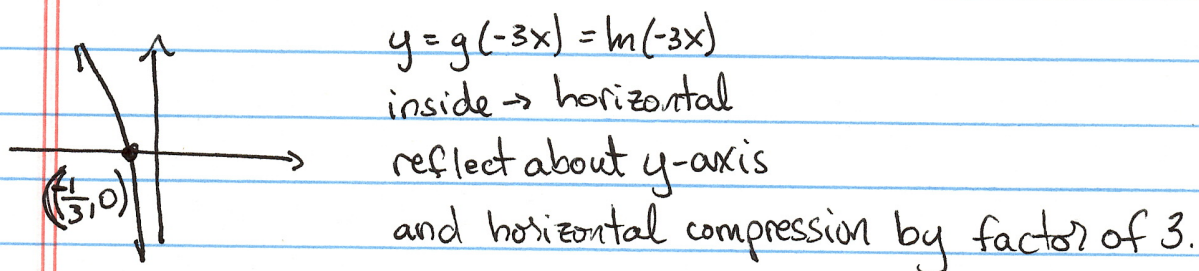
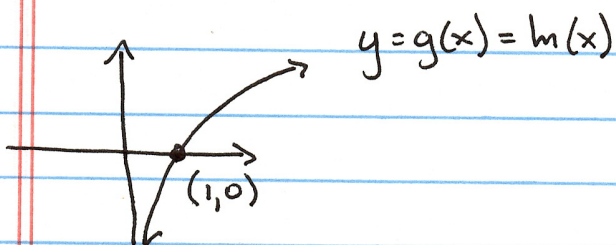


Questions

1. Sketch the graph of $f(x) = -\ln(-3x) + 4$ by transforming $g(x) = \ln(x)$. From your sketch, evaluate $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$, and state the domain and range of f .
2. Sketch the graph of $f(x) = -\ln(12+x) - 3$ by transforming $g(x) = \ln(x)$. From your sketch, evaluate $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$, and state the domain and range of f .
3. A Bank pays 8% annual interest compounded monthly. How long will a deposit of \$5000 amount take to reach an accumulated amount of \$8000?
4. What annual interest rate will it take for a deposit to increase by 5% in one year for an account that compounds continuously?
5. Solve each equation.
 - (a) $\log_5(x) = 3$.
 - (b) $\log_r(16) = 4$.
 - (c) $\ln\left(\frac{1}{\sqrt{e}}\right) = x$.

① $f(x) = -\ln(-3x) + 4$



$\lim_{x \rightarrow \infty} [f(x)]$ does not exist.

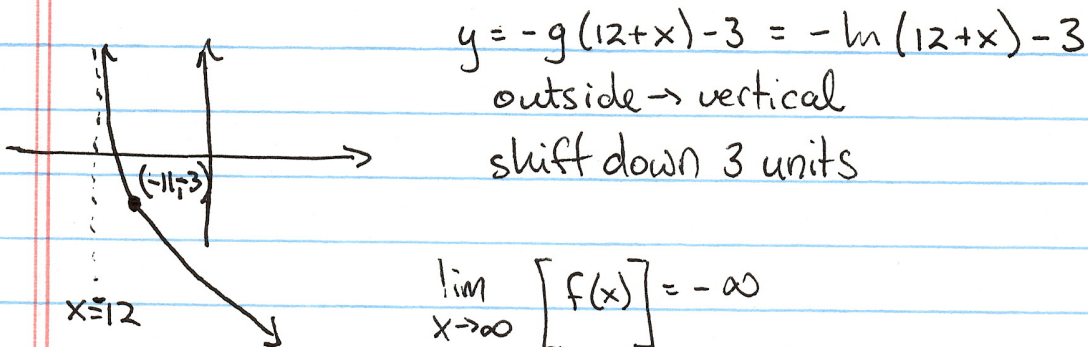
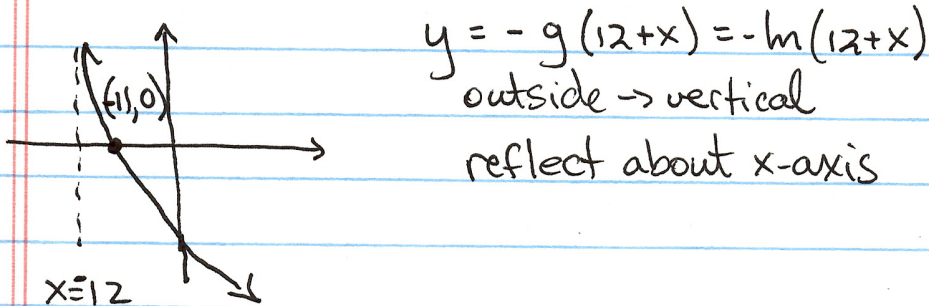
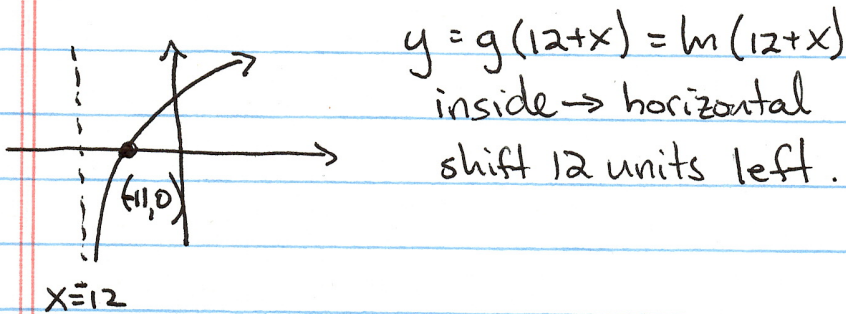
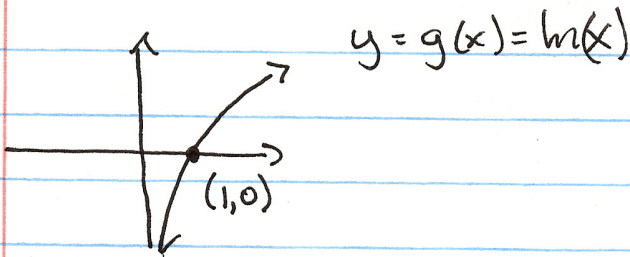
$\lim_{x \rightarrow -\infty} [f(x)] = -\infty$

$\lim_{x \rightarrow 0^-} [f(x)] = \infty$ vertical asymptote

Domain $x \in (-\infty, 0)$

Range $y \in \mathbb{R}$.

② $f(x) = -\ln(12+x) - 3$



$$\lim_{x \rightarrow \infty} [f(x)] = -\infty$$

$$\lim_{x \rightarrow -\infty} [f(x)] \text{ does not exist}$$

$$\lim_{x \rightarrow -12^+} [f(x)] = \infty \quad \text{vertical asymptote}$$

Domain $x \in (-12, \infty)$

Range $y \in \mathbb{R}$.

$$\textcircled{3} \quad A = P(1+i)^m \quad i = r/n$$

A: accumulated amount = \$8000

P = \$5000 Principal

$$i = r/n = 0.08/12 = 0.0066667$$

$$8000 = 5000 (1 + 0.0066667)^m$$

Solve for m:

$$\frac{8}{5} = (1.0066667)^m$$

$$\log_{1.0066667} \left(\frac{8}{5} \right) = m$$

Note: We will

find a better way to solve this once we learn the rules of logarithms.

$$\textcircled{4} \quad A = Pe^{rt} \quad \text{continuous compounding}$$

A = P(1.05) for 5% increase.

t = 1 year

$$P(1.05) = Pe^{r(1)}$$

$$1.05 = e^r$$

$$\ln(1.05) = r \sim 0.04879 = 4.879\%$$

$$(5a) \log_5(x) = 3$$

$$\rightarrow x = 5^3 = 125$$

$$(5b) \log_x(16) = 4$$

$$\rightarrow 16 = 4^x$$

$$4^2 = 4^x$$

$$2 = x$$

$$(5c) \ln\left(\frac{1}{\sqrt{e}}\right) = x$$

$$\ln\left(\frac{1}{e^{1/2}}\right) = x$$

$$\ln(e^{-1/2}) = x$$

$$-1/2 = x.$$