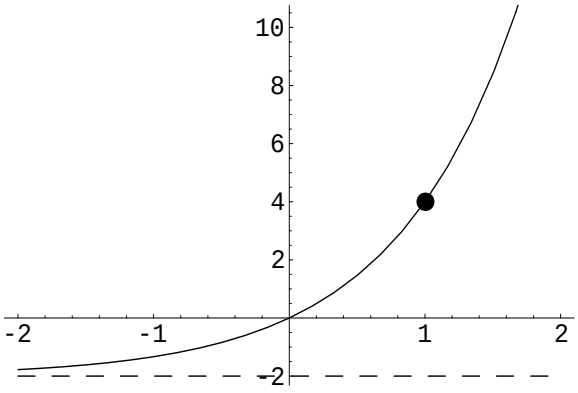
Math 115: Precalculus
Practice test

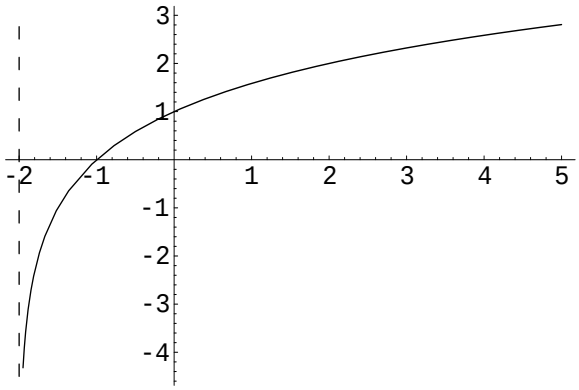
Work in group and discuss **how** to solve the following problems. Don't try too hard to work out the details.

1. The following graph is one of a function of the form $f(x) = c\,a^x - b$. Find the exact formula for $f(x)$ given that $(1, 4)$ is a point on the graph.



$f(x) =$ _____

2. Find the formula for a function $g(x) = \log_a(x + b)$ whose graph is shown below.



$g(x) =$ _____

3. Find the sequence of elementary transformations needed to transform the graph of $y = \ln x$ into the graph of $y = -\ln(-x+1) - 2$.

4. Expand
$$\log_3 \frac{(x^2+1)^{1/2}(x-2)^3(x+4)^{-2/7}}{(x^2+2)^{4/5}}$$

5. Combine
$$\log_2(x-1) - \frac{2}{3}\log_2(x+1) + 2\log_2(x^2+1).$$

6. Solve for the exact value of x:
$$3^{2x+1} = 7^{-x+2}.$$

7. Solve for the exact value of x:

$$\log_2(x-2) = \log_2(x-3) - 2.$$

8. An amount of \$2000 is invested at an interest rate of 7.5% per year, compounded monthly.

   (a) Find the amount of investment after 2 years.

   (b) After how long will the sum amount to \$5000?

9. The half-life of Uranium-234 is 2.7×10^5 years.

   (a) Find the amount remaining from a 100 mg sample after two thousand years

   (b) How long does it take this sample to decompose until its mass is 30 mg?

10. Let

$$f(x) = -3\sin(\pi - 2x)$$

(a) Fill in the following blanks:

Amplitude = _____

Period = _____

Phase shift = _____

(b) How can the graph of $f(x)$ be obtained from the graph of $y = \sin x$?

11. Using the cosine function, construct a periodic function which has amplitude 5, period $\pi/2$ and phase shift $\pi/4$. Then sketch the graph of the function obtained.

12. A person standing on top of a hill sees a building which is 100 ft tall. The angle of elevation to the top of the building is 20^o, the angle of depression to the bottom of the building is 14^o.

(a) Find his distance from the building.

(b) Find the height of the hill relative to the bottom of the building.