1. (20 points) Evaluate the expression.

   (a) $\log_3 81$

   (b) $\log_4 \frac{1}{\sqrt[3]{16}}$

2. (10 points) Write the equation for an exponential function for a city which initially has 10 people and for which the population increases by %50 every year.
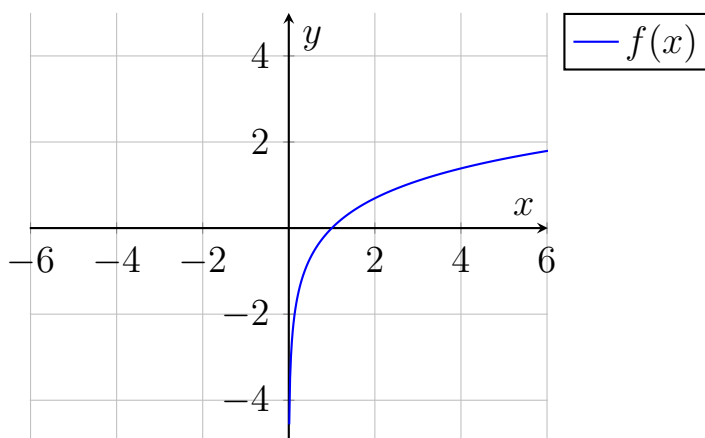
$$f(x) = \underline{\hspace{4cm}}$$

3. (15 points) Solve for x.

   (a) $\log_3 x = 2$

   (c) $\log_2 x^2 = 2$

   (b) $5^x = 15$

4. (15 points) The graph of $\ln(x)$ is shown below. Please draw the graph of $\ln(-x) + 1$.

5. (5 points) Extra credit: Solve $\ln(3x-2) + \ln(x-2) = 2\ln(x)$ **algebraically**.