

Precalculus · Exponential and Logarithmic Functions and Models · Test

Common Core F-LE.A.4, F-BF.B.5, F-IF.C.8b · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This precalculus exponential log test checks exponential and logarithmic functions and models in 45 minutes, with 9 questions for a total of 20 points.

This test has 9 questions worth 20 points in total and takes about 45 minutes. A scientific calculator is allowed. Show your work: a correct final answer with no supporting steps may earn only partial credit.

Test information

- **Grade:** Precalculus
- **Chapter:** Exponential and Logarithmic Functions and Models
- **Common Core:** F-LE.A.4, F-BF.B.5, F-IF.C.8b
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 2 pts; Question 4: 2 pts; Question 5: 2 pts; Question 6: 2 pts; Question 7: 2 pts; Question 8: 3 pts; Question 9: 3 pts)

Precalculus Exponential Log Test: questions 1-5

Question 1: Logarithm basics (2 points)

- Write $7^3 = 343$ in logarithmic form. (1 point)
- Evaluate $\log_{1/3} 9$. (1 point)

Question 2: Laws of logarithms (2 points)

- Expand $\ln \frac{x^3 \sqrt{y}}{z^2}$. (1 point)
- Write $2\log a + 3\log b - \log c$ as one logarithm. (1 point)

Question 3: Inverse function (2 points)

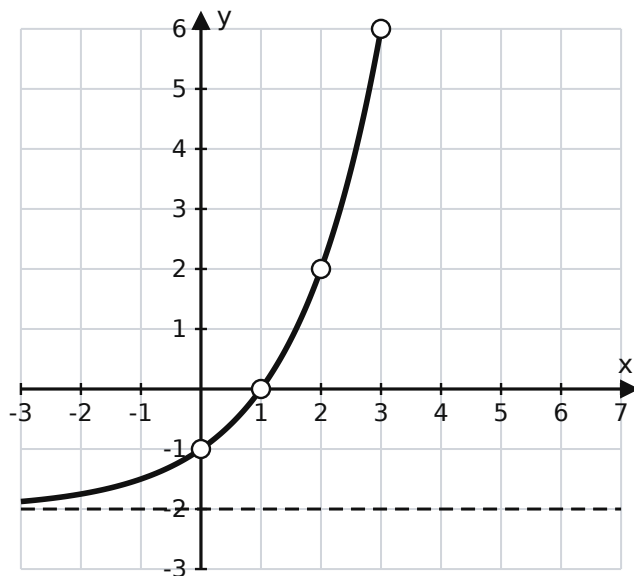
Let $f(x) = 3\ln(x-1) + 2$.

- Find $f^{-1}(x)$. (1 point)

b. State the domain of f^{-1} . (1 point)

Question 4: Graph and inverse (2 points)

The graph of an exponential function f passes through the marked points $(0,-1)$, $(1,0)$, $(2,2)$ and $(3,6)$. The dashed line is its horizontal asymptote.



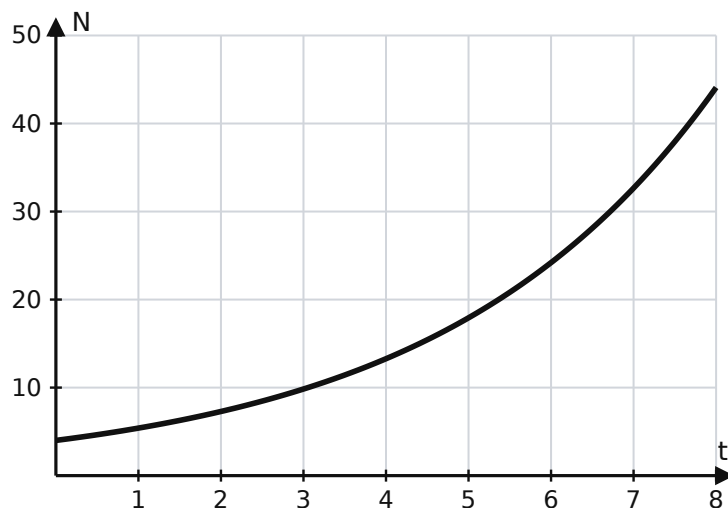
Graph of f with four labeled points.

a. Write an equation for $f(x)$. (1 point)

b. Write an equation for $f^{-1}(x)$ and give the equation of its vertical asymptote. (1 point)

Question 5: Exponential equations (2 points)

A bacteria culture has $N = 4e^{0.3t}$ thousand cells after t hours.



Graph of $N = 4e^{(0.3t)}$.

- Find the time when the culture reaches 20 thousand cells. Round to two decimal places. (1 point)
- Solve $2^{x+1} = 3^x$. Round to three decimal places. (1 point)

Precalculus Exponential Log Test: questions 6-9

Question 6: Logarithmic equation (2 points)

Solve $\log_3(x+2) + \log_3(x-4) = 3$. Explain why any solution you reject is not valid.

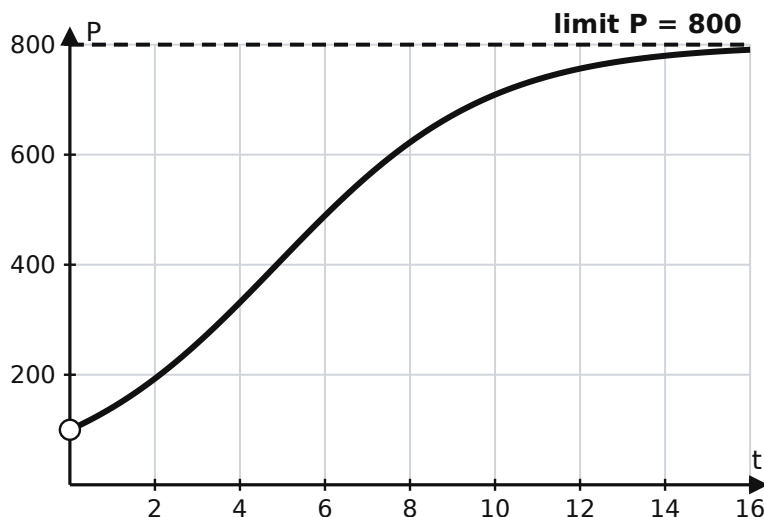
Question 7: Continuous growth (2 points)

The population of a town is 12,000 and grows continuously at 2.4% per year, so $P(t) = 12000e^{0.024t}$.

- Find the population after 10 years, to the nearest person. (1 point)
- Find how many years it takes to reach 20,000. Round to two decimal places. (1 point)

Question 8: Logistic model (3 points)

The number of fish in a pond is $P(t) = \frac{800}{1 + 7e^{-0.4t}}$, where t is in years.



Graph of the fish population.

- Find the initial number of fish. (1 point)
- Find the number of fish the pond approaches over a long time. (1 point)
- Find when the pond holds 400 fish. Round to two decimal places. (1 point)

Question 9: Logarithmic scales (3 points)

- a. An earthquake of magnitude 6.8 is compared with one of magnitude 5.6. How many times greater is the wave amplitude of the stronger one? Round to one decimal place. (1 point)
- b. A solution has $[H^+] = 2.5 \times 10^{-4}$ mol/L. Find its pH to two decimal places. (1 point)
- c. A siren measures 95 dB and a vacuum cleaner 80 dB. How many times greater is the siren's intensity? Round to one decimal place. (1 point)

How to use this precalculus exponential log test

Take this precalculus exponential log test without notes, then grade it with the test answer key out of 20 points.

