

5-9 THE NUMBER e AND THE NATURAL LOGARITHM
MATH III HOMEWORK

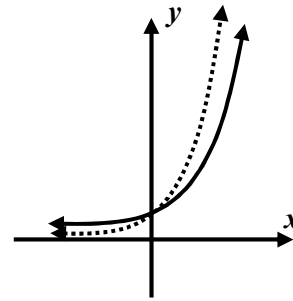
FLUENCY

1. Which of the following is closest to the y -intercept of the function whose equation is $y = 10e^{x+1}$?

- (1) 10 (3) 27
 (2) 18 (4) 52

2. On the grid below, the solid curve represents $y = e^x$. Which of the following exponential functions could describe the dashed curve? Explain your choice.

- (1) $y = \left(\frac{1}{2}\right)^x$ (3) $y = 2^x$
 (2) $y = e^{-x}$ (4) $y = 4^x$



3. The logarithmic expression $\ln\left(\frac{\sqrt{e}}{y^3}\right)$ can be rewritten as

- (1) $3\ln y - 2$ (3) $\frac{\ln y - 6}{2}$
 (2) $\frac{1 - 6\ln y}{2}$ (4) $\sqrt{\ln y} - 3$

4. Which of the following values of t solves the equation $5e^{2t} = 15$?

- (1) $\frac{\ln 15}{10}$ (3) $2\ln 3$
 (2) $\frac{1}{2\ln 5}$ (4) $\frac{\ln 3}{2}$

5. At which of the following values of x does $f(x) = 2e^{2x} - 32$ have a zero?

- (1) $\ln \frac{5}{2}$ (3) $\ln 8$
 (2) $\ln 4$ (4) $y = \ln \frac{2}{5}$



6. For the equation $ae^{ct} = d$, solve for the variable t in terms of a , c , and d . Express your answer in terms of the natural logarithm.

APPLICATIONS

7. Flu is spreading exponentially at a school. The number of new flu patients can be modeled using the equation $F = 10e^{0.12d}$, where d represents the number of days since 10 students had the flu.

(a) How many days will it take for the number of new flu patients to equal 50? Determine your answer algebraically using the natural logarithm. Round your answer to the nearest day.

(b) Find the average rate of change of F over the first three weeks, i.e. $0 \leq d \leq 21$. Show the calculation that leads to your answer. Give proper units and round your answer to the nearest tenth. What is the physical interpretation of your answer?

8. The savings in a bank account can be modeled using $S = 1250e^{0.45t}$, where t is the number of years the money has been in the account. Determine, to the nearest *tenth* of a year, how long it will take for the amount of savings to double from the initial amount deposited of \$1250.

