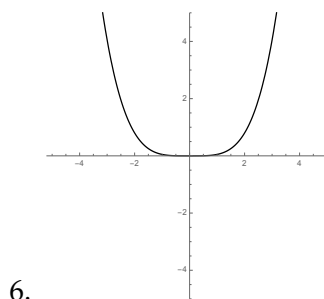
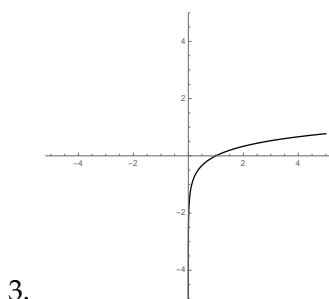
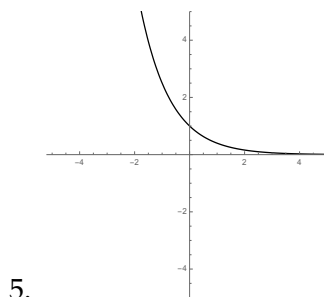
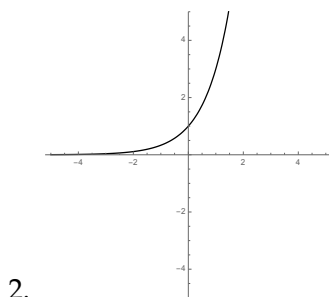
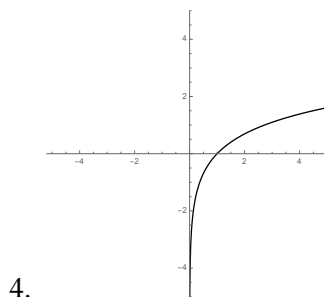
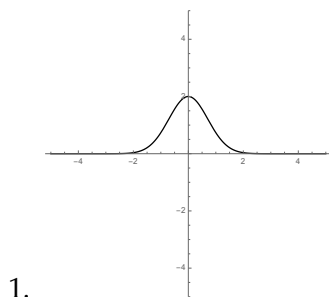


In each of Problems 1-6 below, you are given a graph. For that graph, decide which of the following phrases most accurately describes that graph:

- An exponential function
- A logarithmic function
- Neither exponential nor logarithmic



Rewrite each of the following expressions in terms of natural exponentials and/or natural logarithms:

7. 3^x

9. 8^{xy}

11. $\log 15$

8. $\log_4 z$

10. $(x+3)^{x-4}$

12. 35

Decide whether or not the following expressions can be simplified or rewritten in a useful way using log rules. The answer is YES (it can be simplified/rewritten) or NO (it cannot be simplified/rewritten):

13. $\ln \frac{x^3}{y}$

15. $\ln x + 2$

17. $\ln x + \ln 2$

14. $\ln x^3 y$

16. $\ln(x+2)$

18. $\ln(4x)$

- | | | |
|------------------|-----------------|---------------------------|
| 19. $\ln 4x$ | 22. $\ln x^5$ | 25. $\frac{\ln x}{\ln y}$ |
| 20. $\ln(x+2)^3$ | 23. $(\ln x)^5$ | 26. $\ln \frac{x}{y}$ |
| 21. $5 \ln 4$ | 24. $\ln 5^x$ | 27. $\ln x \ln y$ |

Answers

1. Neither
2. Exponential
3. Logarithmic
4. Logarithmic
5. Exponential
6. Neither
7. $e^{x \ln 3}$
8. $\frac{\ln z}{\ln 4}$
9. $e^{xy \ln 8}$
10. $e^{(x-4) \ln(x+3)}$
11. $\frac{\ln 15}{\ln 10}$
12. $e^{\ln 35}$ or $\ln e^{35}$
13. Yes (it's $3 \ln x - \ln y$)
14. Yes (it's $3 \ln x + \ln y$)
15. No (*)
16. No
17. Yes (it's $\ln 2x$)
18. Yes (it's $\ln 4 + \ln x$)
19. Yes (it's $\ln 4 + \ln x$) (P.S. this is the same as # 18)
20. Yes (it's $3 \ln(x+2)$)
21. Yes (it's $\ln 4^5$)
22. Yes (it's $5 \ln x$)
23. No
24. Yes (it's $x \ln 5$)
25. Yes (it's $\log_y x$)
26. Yes (it's $\ln x - \ln y$)
27. No