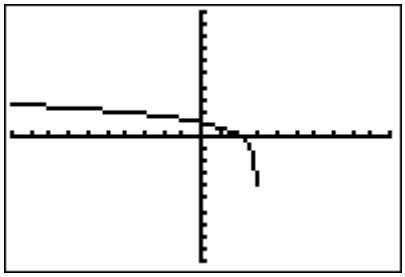
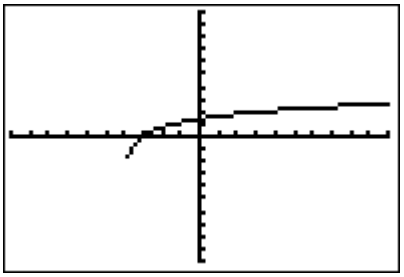
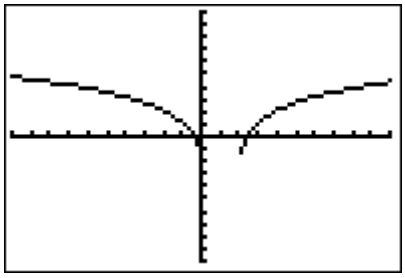
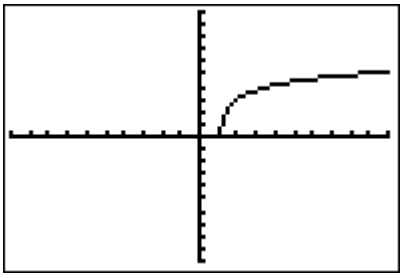
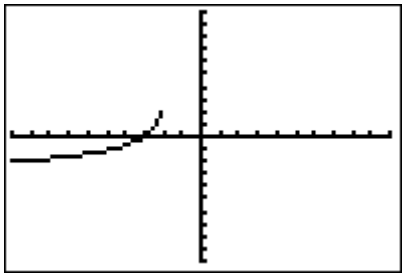
Logarithmic Functions - Key

In problems 1-4, write the logarithmic equation as an exponential equation, or vice versa

1. $e^{1.6094\ldots} = 5$	2. $e^{-0.9162\ldots} = 0.4$
3. $\ln 148.4131\ldots = 5$	4. $\ln 0.0183\ldots = -4$

In problems 5-9, graph the function

5. 	6. 
7. 	8. 
9. 	

In problems 10-12, apply the inverse properties of logarithmic and exponential functions to simplify the expression

10. $8x+3$	11. $3x-4$
12. $5+9x$	

Logarithmic Functions - Key

In problems 13-17, use the properties of logarithms to rewrite the expression as a sum, difference, or multiple of logarithms

13. $2\ln x + \ln y - \ln z$	14. $\frac{1}{2}\ln(4x-1)$
15. $\frac{1}{5}\ln(x-3) - \frac{1}{5}\ln(x+5)$	16. $2\ln x + \frac{1}{2}\ln(x+7)$
17. $\ln 5 + \ln x + 2\ln(x-7) - 2\ln(x+3)$	

In problems 18-22, use the properties of logarithms to rewrite the expression as the logarithm of a single quantity

18. $\ln\frac{x+3}{x-5}$	19. $\ln\frac{x^8}{y^2z^3}$
20. $\ln\sqrt[3]{\frac{x^4}{y^5}}$	21. $\ln\left(\frac{x(x-7)}{(x+3)^2}\right)^8$
22. $\ln\left(x(x-1)\right)^{\frac{5}{2}}$	

In problems 23-33, solve the equation

23. $x = 7 + \ln 2$	24. $x = \frac{\ln 5}{3}$
25. $x = 2$	26. $x = \frac{-1+\ln\frac{1}{2}}{-0.5}$ *or* $x = 2 + 2\ln 2$
27. $x = e^3 - 2$	28. $x = e^2 + 7$

Logarithmic Functions - Key

29. $x = e^2$	30. $x = \dfrac{3e^2}{e^2 - 1}$
31. $x = \dfrac{\ln 5 + \ln 4}{\ln 4}$ $x = \dfrac{\ln 20}{\ln 4}$	32. $x = \dfrac{\ln 4}{\ln 1.03}$
33. $x = \dfrac{\ln 5}{4\ln\left(1 + \dfrac{0.02}{4}\right)}$	

34. t=27.7, t=43.9