$\qquad$

1. If $\log _{b} 3=.442$, use the properties of logarithms to find
a) $\log _{b} 9$
b) $\log _{b} \frac{1}{27}$
2. Use the properties of logarithms to
a) Expand: $\log 15 x^{2} y^{5}$
b) Condense: $4 \log x-(2 \log y+3 \log z)$

Solve the following equations. Check your answers. Round answers to three decimal places if necessary.
3. $16^{2 x+1}=8^{x+1}$
4. $4+2\left(7^{x+3}\right)=400$
5. $\operatorname{Ln}(x-3)=\ln (2 x-4)$
6. $\log _{2}(2 x+6)=3$
7. $\log _{4} x+\log _{4}(x-6)=2$
8. Write the exponential function , $y=a b^{x}$ whose graph passes through $(2,4)$ and $(5,108)$
9. The wind speed $s$ (in miles per hour) near the center of a tornado can be modeled by $s=20 \log d+15$, where d is the distance (in miles) that the tornado travels.
a) A tornado travels 20 miles. Estimate the wind speed near the center of the tornado. Round off to the near Thousandth.
b) The wind speed near the center of a tornado was 120 miles per hour. Find the distance that the tornado traveled.
10. 40 grams of Radium is stored in a container. The amount $R$ (in grams) of radium present after $t$ years can be modeled by $\mathrm{R}=40 e^{-.025 t}$. After how many years will there be only 25 grams present?
11. Determine the type of function represented by the table. Explain your reasoning.

| $x$ | -3 | -1 | 1 | 3 | 5 | 7 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $y$ | 61 | 5 | 5 | 13 | -19 | -139 |

