EXPONENTS AND LOGS: Corrective Assignment

PROPERTIES

Evaluate $(+2$ pts each $)$

1. $\quad \log _{\left(\frac{1}{2}\right)}\left(\frac{1}{8}\right)$

3
2. $\quad \log _{2} \frac{1}{256}$

3. $\quad \log _{\pi} 1$

Express in the exponential form ( +2 pts each)
4. $\log _{13} 2197=3$
5. $\quad \log 10,000=4$
6. $\ln e=1$

$$
13^{3}=2197
$$

$$
10^{4}=10,000
$$

7. $\log _{5} a+\frac{1}{3} \log _{5} b$
8. $\frac{1}{2} \ln x-8 \ln 7$

$$
\log _{5} a \sqrt[3]{b}
$$



Condense (Write as a single logarithm). (+2 pts each)

Evaluate to $\mathbf{3}$ decimal places. ( +2 pts each)
11. $\log _{5} 22(.921$
${ }_{12}$ ns s 3.932
13. $\log _{7} 51 \_$2.OZ1

Solve for the indicated variable. Round to three digits where applicable. (+4 pts each)
14. $\left(2^{(x+2)}\right)^{(x-2)}=4096$
15. $3^{3 k+3} \cdot \frac{1}{27}=81$

$$
\begin{gathered}
2^{(x+2)(x-2)}=2^{12} \\
2^{x^{2}-4}=2^{12} \\
x^{2}-4=12 \\
x^{2}-16=0 \\
x= \pm 4 \\
x=4
\end{gathered}
$$

$$
3^{3 k+3} \cdot 3^{-3}=3^{4}
$$

$$
3^{3 k}=3^{4}
$$

$$
3 k=4
$$

$$
\begin{aligned}
\text { 1.) } \begin{aligned}
6^{x}+6 & =66 \\
6^{x} & =60 \\
x \log 6 & =\log 60 \\
x & =\frac{\log 60}{\log 6}
\end{aligned}
\end{aligned}
$$

$$
k=\frac{4}{3} \quad x=2.285
$$

$$
\begin{aligned}
& \text { Expand. (Write as sum or diff of logs). (+2 pts each) } \\
& \text { 9. } \log _{6} 6 y \sqrt{w z} \\
& \text { 10. } \quad \log _{9}\left(3^{4} \cdot 2^{6}\right)^{2} \\
& \log _{9} 3^{\circ} \cdot 2^{12} \\
& 8 \log _{a} 3+12 \log _{9} 2 \\
& \text { Expand. (Write as sum or diff of logs). (+2 pts each) }
\end{aligned}
$$

For questions 16 - 19, solve for the indicated variable. Round to three digits where applicable. $(+4$ pts each $)$

$$
\begin{aligned}
& \text { 17. }(\log (x-5)+\log x)=1 \\
& 10^{10} \\
& 10^{\log (x-5) \cdot 10^{\prime} x}=10 \\
& (x-5)(x)=10
\end{aligned}
$$

18. $2 \log _{5} k-3=5$
$2 \log _{5} k=8$
$\log _{5} k=4$
5

$$
K=
$$

19. $2 \log _{5}(x+3)=5 \quad 5$

$$
\log _{5}(x+3)=-2
$$

$$
x+3=5^{\left(\frac{5}{2}\right)}
$$

20. $7 e^{d-2}=21$

$$
\begin{aligned}
& e^{d-2}=3 \\
& \ln e^{d-2}=\ln 3 \\
& (d-2) \ln e=\ln 3 \\
& \text { Find the inverse of the given function. }+4 \text { p pts ac }
\end{aligned}
$$

Find the inverse of the given function. (+4 pts each)

$$
\begin{aligned}
& \text { 21. } \begin{array}{l}
f(x)=7^{x+2} 2 \\
x=7 \\
\log x=(y+2) \log 7 \\
f^{-1}(x)=\frac{\log x}{\log 7}-2
\end{array}
\end{aligned}
$$

$$
\begin{aligned}
\begin{aligned}
& x^{2}-5 x-10=0 \\
& x=\frac{5 \pm \sqrt{(-5)^{2}-4(1)(-10)}}{2(1)}, x \\
&=\frac{5 \pm \sqrt{65}}{2} \longrightarrow x=6.531 \\
& x=4.531 \\
& \text { ExTRANEOUS, } \\
& k=625
\end{aligned}
\end{aligned}
$$

$$
x=\underline{52.902}
$$

$$
x=5^{\frac{5}{2}}-3
$$

$$
\approx 52.902
$$

$$
d=3.099
$$

$$
(d-2)(1)=\ln 3
$$

$$
d=\ln 3+2
$$

$$
d=3.099
$$

22. $e^{\ln y=\ln (2 x-1)} e$

$$
\begin{aligned}
& x=2 y-1 \\
& x+1=2 y \\
& f^{-1}(x)=\frac{x+1}{2}
\end{aligned}
$$

Solve for the missing variables: $(+1$ pt each $)$
23.

24.


25. The half-life of a certain radioactive substance is 8.5 seconds. If the initial value is 3200 grams, find how long it will take for there to be 200 grams of the radio active substance. ( +4 points)

$$
\begin{aligned}
& 200=3200\left(\frac{1}{2}\right)^{\frac{t}{8.5}} \\
& \frac{200}{3200}=\left(\frac{1}{2}\right)^{\frac{t}{2.5}}
\end{aligned}
$$

$$
A=A_{0}\left(\frac{1}{2}\right)^{\frac{t}{h}}
$$

$$
\begin{aligned}
& \log \frac{200}{3200}=\frac{t}{8,5} \log \left(\frac{1}{2}\right) \\
& t=\frac{\log \frac{200}{3200}}{\log \left(\frac{1}{2}\right)} \cdot(8.5)=34 \mathrm{sEC}
\end{aligned}
$$

26. Find how long you need to invest $\$ 200$ at $3.5 \%$ interest compounded quarterly for your investment to equal $\$ 2500$. (+4 points)

$$
\begin{aligned}
(+4 \text { points) } & A=A_{0}(1+5)^{n t} \\
2550 & =20 d\left(1+\frac{.035}{4 t}\right)^{4 t} \\
12.5 & =(1.00875)^{4+t}
\end{aligned}
$$

$$
\begin{aligned}
& 4 t=\frac{\log 12.5}{\log (1.00575)} \\
& t=72.479 \text { yea /s }
\end{aligned}
$$

27. Bean has a BBQ for his basketball team and starts his grill, which promptly heats up to about $350^{\circ} \mathrm{F}$. He then gets distracted by the hamburger dance and his gas grill runs out of propane. When Bean checks his grill 5 minutes after the propane ran out, the grill has cooled to $275^{\circ} \mathrm{F}$. Assume the outside temperature was $45^{\circ} \mathrm{F}$.
a. Use Newton's Law of Cooling to find k. (+4 points)

$$
T(t)=T(s)+\left(T_{0}-T_{s}\right) e^{-k t}
$$

$$
\begin{aligned}
& 275=45+(350-45) e^{-k(5)} \\
& 754098=e^{-5 k} \\
& \ln .754098=-5 k
\end{aligned}
$$

b. How long will it take the grill to cool down to a safe temperature $\left(90^{\circ} \mathrm{F}\right)$ ? ( +4 pts )

$$
\begin{gathered}
90=45+(350-45) e^{-(056(6446) t} \\
\ln (.006557)=\ln e^{-(.056446) t} \\
89.06 \text { min }=t
\end{gathered}
$$

28. Use the given parent functions to write the equations of the functions below.



$$
f(x)=\left(\frac{1}{5}\right)^{x}
$$

$$
f(x)=2 \cdot 3^{x}
$$




$$
\rightarrow 3
$$



29. Sully invests $\$ 1$ at $9 \%$ interest, compounded continuously. In how many years will that $\$ 1$ investment be worth \$100? (+4 pts)


