Pre-Calculus
LESSON 3.1-3.2-3.3

NAME Key **DATE** **PER**

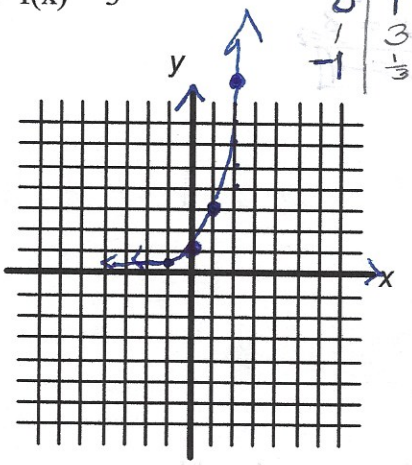
I. List the five properties of the exponential function $f(x) = b^x$ [$b \neq 0$, $b > 1$]

1) Domain: $(-\infty, \infty)$ Range: $(0, \infty)$
2) No x-int.; y-int: $(0, 1)$
3) NO VA; HA: $y = 0$ (x-axis)
4) $b > 1$ increasing (Expo Growth) behavior
5) $0 < b < 1$ decreasing (Expo Decay) one-to-one

II. Graph the following exponential functions:

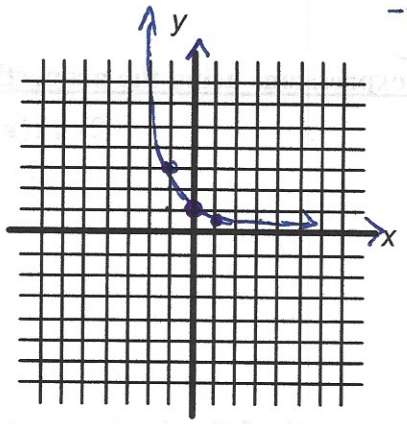
1) $f(x) = 3^x$

x	y
0	1
1	3
-1	$\frac{1}{3}$



2) $g(x) = \left(\frac{1}{3}\right)^x$

x	y
0	1
1	$\frac{1}{3}$
-1	3



3) As the value of x increases, what happens to the values of **f(x)**? increases
exp. Growth ($b > 1$)

4) As the value of x increases, what happens to the values of **g(x)**? decreases
exp. decay ($0 < b < 1$)

III. How can you transform the graph of $f(x) = 5^x$ to obtain the graph of:

1) $g(x) = 5^{x+3}$ Shift $f(x)$ 3 units left. (horizontal shift)
2) $h(x) = 5^x - 4$ Shift $f(x)$ 4 units down. (vertical shift).

IV Find a) the horizontal asymptote and b) the y-intercept of the following functions:

1) $g(x) = 4^x + 2$ a) $y = 2$. b) $(0, 3)$
2) $h(x) = 5^{-x} - 3$ a) $y = -3$. b) $(0, -2)$.

V. 1) Evaluate and round to four decimal places: $\log_6 35 = \frac{\log 35}{\log 6} \approx 1.9843$ 1) 1.9843.
<Chg of Base formula>

2) Find the accumulated value of an investment of $15,000 for 8 years at an interest rate of 6.5% if the money is compounded as follows:

a) **Quarterly** $A = P\left(1 + \frac{r}{n}\right)^{nt}$

$A = 15{,}000\left(1 + \frac{.065}{4}\right)^{4(8)}$
$= 15000(1.016625)^{32}$
$A \approx \$25{,}125.18$

b) **Continuously** $A = Pe^{rt}$

$A = 15000e^{.065(8)}$
$A \approx \$25{,}230.41$

2) a) $25,125.18
b) $25,230.41

VI. Solve:

1) $3^{8x+2} = 9^{2x-3}$

$9^{2x-3} = (3^2)^{2x-3}$

$3^{8x+2} = 3^{4x-6}$

$8x+2 = 4x-6$

$-4x \quad -2$

$4x = -8$

$\frac{4}{4}$

$x = -2$

2) $\left(\frac{1}{5}\right)^6 = \left(\frac{1}{25}\right)^x$

$\frac{1}{5} = 5^{-1}$, $\frac{1}{25} = 5^{-2}$

$(5^{-1})^6 = (5^{-2})^x$

$5^{-6} = 5^{-2x}$

$-2x = -6$

$\frac{-2}{-2}$

$x = 3$

3) $4^x = \frac{1}{64}$

$4^x = 4^{-3}$

$x = -3$

4) $32 = 4^x$

$2^5 = (2^2)^x$

$2^5 = 2^{2x}$

$2x = 5$

$\frac{2}{2}$

$x = \frac{5}{2}$

5) $2^{-2x} = 256$

$2^{-2x} = 2^8$

$-2x = 8$

$\frac{-2}{-2}$

$x = -4$

1)	$x = -2$
2)	$x = 3$
3)	$x = -3$
4)	$x = \frac{5}{2}$
5)	$x = -4$

Expand the following log expressions using the properties of logs:

1) $\log_6 \frac{\sqrt{x}}{36}$

$\log_6 \sqrt{x} - \log_6 36$

$\log_6 x^{\frac{1}{2}} - \log_6 6^2$

$\frac{1}{2}\log_6 x - 2\log_6 6$

$\frac{1}{2}\log_6 x - 2$

2) $\ln(e^5 x^3)$

$\log_e e^5 + \log_e x^3$

$5\log_e e + 3\log_e x$

$5 + 3\log_e x$

OR

$\ln e^5 + \ln x^3$

$5\ln e + 3\ln x$

$5 + 3\ln x$

Condense (Write as a single log) the following log expressions using the properties of logs:

3) $4\ln x + 7\ln y - 3\ln z$

$\ln x^4 + \ln y^7 - \ln z^3$

$\ln x^4 y^7 - \ln z^3$

$\ln \frac{x^4 y^7}{z^3}$

4) $6\log x - 2\log y - \log z$

$\log x^6 - \log y^2 - \log z$

$\log x^6 - (\log y^2 + \log z)$

$\log x^6 - \log y^2 z$

$\log \frac{x^6}{y^2 z}$

1)	$\frac{1}{2}\log_6 x - 2$
2)	$5 + 3\ln x$
3)	$\ln \frac{x^4 y^7}{z^3}$
4)	$\log \frac{x^6}{y^2 z}$