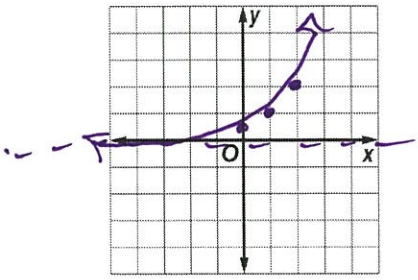
Pre – Calculus
REVIEW 3.1 – 3.3

Name Key

3-1 Practice

Without a calculator, sketch and analyze the graph of each function. State any transformations from the parent function, the domain, range, asymptote equation and end behavior.

1. $f(x) = 2^{x-1}$

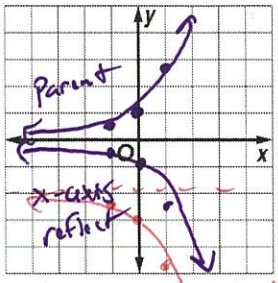


$y = 2^x$

x	y
-1	1/2
0	1
1	2

x	y
0	1/2
1	1
2	2

2. $h(x) = -e^x - 2$



Fine!

$y = e^x$ ·(-1) -2

x	y
-1	.4
0	1
1	2.7

x	y
-1	-.4
0	-1
1	-2.7

x	y
-1	-2.4
0	-3
1	-4.7

3. In 2000, the number of people in the United States was estimated at 2.81 billion. In 2015 the population was approximately 3.20 billion. Find the growth rate as a percentage rounded to the nearest hundredth.

$3.2 = 2.81(1+r)^{15}$

$.0087.. = r$

.87%

4. Determine the amount of money in a savings account that provides an annual rate of 4% compounded **a) monthly b) weekly and c) continuously**, if the initial deposit is $1000 and the money is left in the account for 5 years.

a) $y = 1000\left(1 + \frac{.04}{12}\right)^{12(5)}$

$1221.00

b) $y = 1000\left(1 + \frac{.04}{52}\right)^{52(5)}$

$1221.31

c) $y = 1000e^{.04(5)}$

$1221.40

3-2 Practice

Evaluate each expression.

5. $\log_7 7^3$ 3

6. $\log 0.001$ $\log_{10} 10^{-3}$ (-3)

7. $\log_8 4096$ $\log_8 8^4$ (4)

8. $2 \ln e^5$ (10)

9. $e^{\ln 0.014x}$ .014x

Rewrite the equation in logarithmic form.

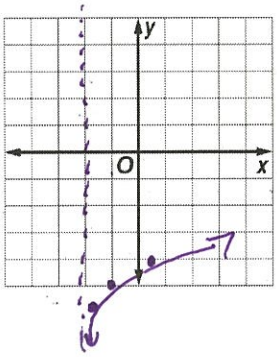
10. $7^2 = 49$ $2 = \log_7 49$

11. $100^{\frac{1}{2}} = 10$ $\frac{1}{2} = \log_{100} 10$

12. $16^{-2} = \frac{1}{256}$ $-2 = \log_6\left(\frac{1}{256}\right)$

Without a calculator, sketch and analyze the graph of each function. State any transformations from the parent function, the domain, range, asymptote equation and end behavior.

13. $g(x) = \ln(x + 2) - 5$



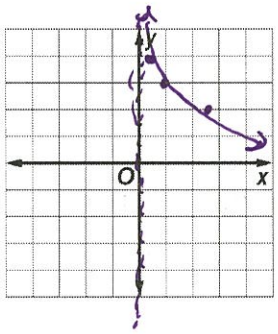
$e^y = x$ -2 -5

x	y
.4	-1
1	0
2.7	1

x	y
-1.6	-1
-1	0
.7	1

x	y
-1.6	-6
-1	-5
.7	-4

14. $g(x) = -\ln x + 3$



$e^y = x$ $\cdot(-1)$ then $+3$

x	y
.4	-1
1	0
2.7	1

x	y
.4	4
1	3
2.7	2

3-3 Practice

Express each logarithm in terms of ln 10 and ln 3.

15. $\ln 300$

$\ln(100 \cdot 3)$

$\ln(10^2 \cdot 3)$

$2\ln 10 + \ln 3$

16. $\ln 27000$ $\ln(27 \cdot 1000)$

$\ln(3^3 \cdot 10^3)$

$3\ln 3 + 3\ln 10$

17. $\ln \frac{10}{9}$ $\ln \frac{10}{3^2}$

$\ln 10 - 2\ln 3$

18. $\ln \frac{729}{10000}$ $\ln\left(\frac{3^6}{10^4}\right)$

$6\ln 3 - 4\ln 10$

Expand each expression.

19. $\ln \frac{y(x+1)}{\sqrt[4]{z-5}}$

$\ln y(x+1) - \ln \sqrt[4]{z-5}$

$[\ln y + \ln(x+1)] - \frac{1}{4}\ln(z-5)$

20. $\ln[(2x)^3(x+1)]$

$3\ln 2 + 3\ln x + \ln(x+1)$

21. $\ln \frac{3x^4}{\sqrt[3]{7x-3}}$

$[4\ln x + 3\ln] - \frac{1}{3}\ln(7x-3)$

22. $\ln \frac{(x+1)^3}{\sqrt[3]{x+5}}$ $3\ln(x+1) - \frac{1}{3}\ln(x+5)$

Condense each expression.

23. $\frac{1}{2}\ln(3x - 5y) - \ln(4x + y)$

$\ln \frac{\sqrt{3x-5y}}{4x+y}$

24. $3\ln(5x + 6) - \frac{1}{2}\ln(x - 4)$

$\ln \frac{(5x+6)^3}{\sqrt{x-4}}$

25. $\ln 2x - (\ln 6 - 2\ln x)$

$\ln 2x - [\ln \frac{6}{x^2}]$

$\ln \frac{2x}{\frac{6}{x^2}}$ $\ln \frac{2x \cdot x^2}{6}$

$\ln \frac{x^3}{3}$

26. $[\ln 8 + \ln x] - 2\ln(x + 4)$

$\ln 8x - \ln(x+4)^2$

$\ln \frac{8x}{(x+4)^2}$

27. $\ln y + \ln 3 - \frac{1}{3}\ln(x) + 2\ln z$

$\ln 3y - \ln x^{1/3} + \ln z^2$

$\ln \frac{3y}{x^{1/3}} + \ln z^2$

$\ln \frac{3z^2y}{\sqrt[3]{x}}$

28. $\ln y + \ln x - (\frac{1}{2}\ln x + 3\ln z)$

$\ln xy - (\ln z^3\sqrt{x})$ $\ln \frac{xy}{z^3\sqrt{x}}$

Use the change of base formula to evaluate each logarithm. Round to the nearest hundredth.

29. $\log_{\frac{1}{2}} \frac{1}{5}$

2.32

30. $\log_{100} 200$

1.15