

Name: Key Period: _____

PreCalculus - Review for test exponential and logs

1 Evaluate without using a calculator. $\log_3 27$

$27 = 3^x$ OR $\log_3 3^3 = 3$
 $3^3 = 3^x$
 $3 = x$

2 Find the value of \$1000 deposited for 8 years in an account paying 8% annual interest compounded continuously.

$A = Pe^{rt}$
 $A = 1000 e^{0.08(8)}$
 $\approx 1,896.48$

3 If a person takes 125 milligrams of drugs, whose concentration decreases by 30% each hour, what is the approximate concentration of the drug in his bloodstream after 3 hours?

$y = a(1-r)^x$ $a = 125$
 $y = 125(1-0.30)^3$ $r = .30$
 $= 125(.70)^3$ $t = 3$
 $y = 42.88 \text{ mil.}$

4 You deposit \$3500 in an account that pays 4.5% annual interest. Find the balance after 5 years if the interest is compound monthly?

$A = P(1 + \frac{r}{n})^{nt}$
 $A = 3500(1 + \frac{0.045}{12})^{12(5)} \approx \4351.29

Evaluate the expression without using a calculator.

5 $\log_{\frac{1}{2}} 4$ $4 = x^{\frac{1}{2}}$
 $\Rightarrow 16$

6 $\ln e \Rightarrow 1$

* 7 Simplify

a) $\log_8(\log_2 \sqrt{16})$
 $\log_8(2)$

$16^{\frac{1}{2}} = 2^x$
 $4 = 2^x$
 $2^2 = 2^x$
 $2 = x$

$\frac{1}{3}$

b) $\log_8 \frac{1}{64}$

$\frac{1}{64} = 8^x$
 $\frac{1}{8^2} = 8^x$
 $8^{-2} = 8^x$

$\Rightarrow -2$

c) $\log_{125} 25^{x+5} + \log_{27} 81^6$

$x+5 \log_{125} 25 + 6 \log_{27} 81$ $81 = 27^x$
 $x+5(\frac{2}{3}) + 6(\frac{4}{3})$ $3^4 = 3^{3x}$

$\frac{2}{3}x + \frac{10}{3} + \frac{24}{3} = \frac{2x+34}{3}$ $\frac{4}{3} = x$

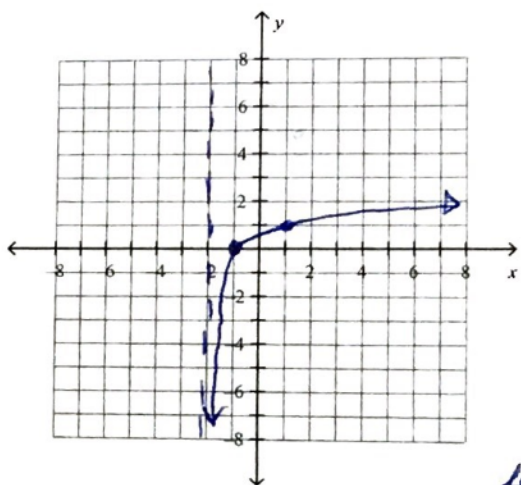
$\frac{2x+34}{3}$

8 Graph: $f(x) = \log_3(x+2)$

Domain: $\{x \in \mathbb{R} | x > -2\}$

Range: $\{y \in \mathbb{R}\}$

Horizontal or vertical asymptote and state: $x = -2$



$\log_3 x$
 $\frac{x}{y} = 3$
 $\frac{1}{0} = 3$

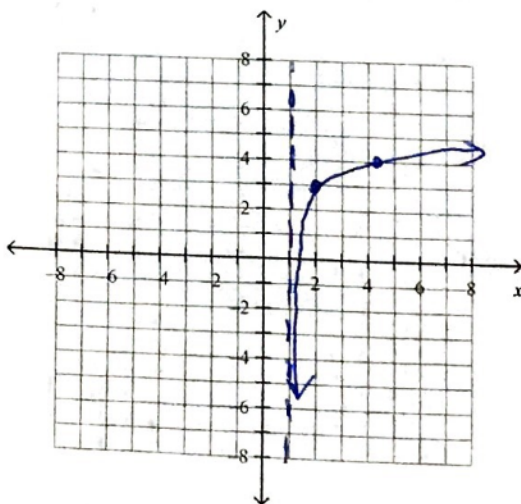
$\log(x+2)$
 $-2 + \frac{x}{y} = 1$
 $\frac{-1}{0} = 1$

9 Graph: $f(x) = \log_3(x-1) + 3$

Domain: $\{x \in \mathbb{R} | x > 1\}$

Range: $\{y \in \mathbb{R}\}$

Horizontal or vertical asymptote and state: $x = 1$



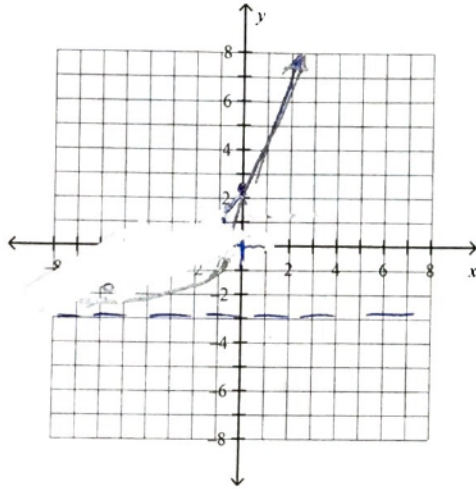
$\log_3 x$
 $\frac{x}{y} = 3$
 $\frac{1}{0} = 3$
 $1 + \frac{x}{y} = 3$
 $\frac{2}{0} = 3$
 $\frac{4}{0} = 3$

10 Graph: $f(x) = 2e^{x+1} - 3$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y < -3\}$

Horizontal or vertical asymptote and state: $y = -3$



Solve.

11 $4e^x - 2 = 14$
 $\frac{4e^x}{4} = \frac{16}{4}$
 $e^x = 4$
 $x = \ln 4$ ← exact
 $x \approx 1.386$ ← 3 decimal places

12 $5 \log_2 x = 24$
 $\log_2 x = \frac{24}{5}$
 $2^{24/5} = x$
 $x \approx 27.86$

Solve the equation. Check for extraneous solutions.

13 $10^{3x+5} = 10^{x-3}$
 $\frac{3x+5}{-x-5} = \frac{x-3}{x-5}$
 $\frac{2x}{2} = \frac{-8}{2}$ $x = -4$

14 $\log_3(2x-1) = 2$
 $2x-1 = 3^2$
 $2x-1 = 9$
 $2x = 10$
 $x = 5$

15 $\log_5(4x+1) = \log_5(2x+7)$
 $\log_5(4x+1) - \log_5(2x+7) = 0$
 $\log_5 \frac{4x+1}{2x+7} = 0$
 $\frac{4x+1}{2x+7} = 5^0$
 $\frac{4x+1}{2x+7} = 1$
 $4x+1 = 2x+7$
 $2x = 6$
 $x = 3$

By prop. of logs same case.

$2e^x$
 $\frac{x}{y} \mid \frac{y}{x}$
 $0 \mid 2$
 $1 \mid 2(2.71)$
 5.42

$2e^{x+1} - 3$
 $\frac{x}{y} \mid \frac{y}{x}$
 $-1 \mid -1$
 $0 \mid 2.42$

16 $\log_2(y+4) + \log_2 y = 5$

$\log_2 y(y+4) = 5$
 $\log_2 y^2 + 4y = 5$

Expand the expression.

$y^2 + 4y = 2^5$
 $y^2 + 4y = 32$
 $y^2 + 4y - 32 = 0$
 $(y+8)(y-4) = 0$
 $y = -8, y = 4$
 extraneous soln b/c (-)

17 $\log_5 x^{1/3} y^6$
 $\frac{1}{3} \log_5 x + 6 \log_5 y$

Condense the expression.

18 $3 \log_3 15 + 2 \log_3 x - \log_3 25$
 $\log_3 \frac{15^3 x^2}{25}$ OR $\log_3 \frac{3375 x^2}{25}$

Use the change-of-base formula to evaluate the expression.

19 $\log_5 23 = \frac{\log_{10} 23}{\log_{10} 5}$
 ≈ 1.948

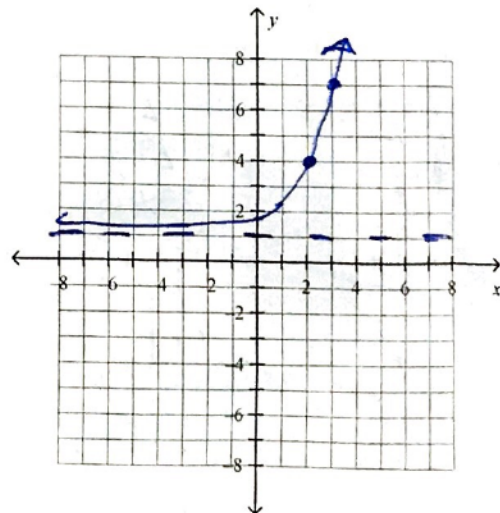
$\log_b x = \frac{\log_{10} x}{\log_{10} b}$

20 Graph: $f(x) = 3 \cdot 2^{x-2} + 1$

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y > 1\}$

Horizontal or vertical asymptote and state: $x = 1$



$3 \cdot 2^x$
 $\frac{x}{y} \mid \frac{y}{x}$
 $0 \mid 3$
 $1 \mid 6$
 $+2$
 $\frac{x}{y} \mid \frac{y}{x}$
 $2 \mid 4$
 $3 \mid 7$

$$4x+1 = 2x+7$$

$$2x = 6$$

$$x = 3$$