

5.1-5.3 REVIEW WS

Name: KEY

Date: _____ Period: _____

1) 2^{30000} is a big number! How many digits does it have? Approximate it using powers of 10.

$$2^{30000} = (2^{10})^{3000} \approx (10^3)^{3000} \quad (2^{10} \approx 1000 = 10^3)$$

$$\approx 10^{9000} \quad \boxed{9001 \text{ digits}}$$

These problems are ALL MIXED UP. Solve for x. Remember, when you're "stuck" switch forms! Some (or maybe just the first problem :) are NOT exponential or log equations.

2) $x^{\frac{3}{2}} = 64$

$$(x^{\frac{3}{2}})^{\frac{2}{3}} = (4^3)^{\frac{2}{3}}$$

$$x = 4^{-2}$$

$$\boxed{x = \frac{1}{16}}$$

3) $10^x = 25$

$$\boxed{x = \log_{10} 25}$$

4) $9^{x+1} = \frac{1}{27}$

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

$$2x+2 = -3$$

$$2x = -5$$

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

5) $\left(\frac{1}{9}\right)^{2x-5} = 27^{x+3}$

$$(3^{-2})^{2x-5} = (3^3)^{x+3}$$

$$-4x+10 = 3x+9$$

$$-7x = -1$$

$$\boxed{x = \frac{1}{7}}$$

6) $e^{-3x+5} = 7$

$$\ln e^{-3x+5} = \ln 7$$

$$-3x+5 = \ln 7$$

$$-3x = \ln 7 - 5$$

$$\boxed{x = \frac{\ln 7 - 5}{-3}}$$

7) $\log_4(5x-1) = 3$

$$4^3 = 5x-1$$

$$64 = 5x-1$$

$$65 = 5x$$

$$\boxed{x = 13}$$

8) $\ln(2x-3) = 3$

$$e^{\ln(2x-3)} = e^3$$

$$2x-3 = e^3$$

$$2x = e^3 + 3$$

$$\boxed{x = \frac{e^3 + 3}{2}}$$

9) $8^{x-2} = \sqrt{32}$

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

$$3x-6 = \frac{5}{2}$$

$$3x = \frac{17}{2}$$

$$\boxed{x = \frac{17}{6}}$$

10) $\left(\frac{4}{9}\right)^{x+5} = \left(\frac{3}{2}\right)^{x+8}$

$$\left(\left(\frac{2}{3}\right)^2\right)^{x+5} = \left(\left(\frac{2}{3}\right)^{-1}\right)^{x+8}$$

$$2x+10 = -x-8$$

$$3x = -18$$

$$\boxed{x = -6}$$

Evaluate the logarithmic expressions **WITHOUT A CALCULATOR**:

14) $\log_4 4$

$\boxed{1}$

15) $\log_6 1$

$\boxed{0}$

16) $\log \sqrt[7]{10}$

$\log_{10} 10^{-\frac{1}{7}}$
 $\boxed{-\frac{1}{7}}$

17) $\log_{10} 10^{-4}$

$\log_{10} 10^{-4}$
 $\boxed{-4}$

18) $\ln e^6$

$\ln e^6$
 $\boxed{6}$

19) $\ln \frac{1}{e}$

$\ln e^{-1}$
 $\ln e^{-1}$
 $\boxed{-1}$

20) $\log_{64} \frac{1}{256}$

$\log_{4^3} (\frac{1}{4^4}) \leftarrow 4^{-4}$
 $(4^3)^? = 4^{-4}$
 $\boxed{-\frac{4}{3}}$

21) $\log_{16} (1/32)$

$\log_{2^4} (2^{-5}) \leftarrow 2^{-5}$
 $(2^4)^? = 2^{-5}$
 $\boxed{-\frac{5}{4}}$

22) $\log_{10} .0001$

$\log_{10} 10^{-4}$
 $\boxed{-4}$

23) $\log_3 9\sqrt{3}$

$\log_3 3^2 \cdot 3^{\frac{1}{2}}$
 $3^? = 3^{\frac{5}{2}}$
 $\boxed{\frac{5}{2}}$

24) $\ln 1$

$\boxed{0}$

25) $\log_4 \frac{1}{\sqrt[3]{32}}$

$\log_{2^2} (2^{-\frac{5}{3}}) \leftarrow 2^{-\frac{5}{3}}$
 $\log_2 2^{-\frac{5}{3}}$
 $2^? = 2^{-\frac{5}{3}}$
 $\boxed{-\frac{5}{3}}$

Simplify the following expressions:

26) $\ln e$

$\boxed{1}$

27) $\ln e^{-4}$

$\log_e e^{-4}$
 $\boxed{-4}$

28) $(\ln e)^{-3}$

$(1)^{-3}$
 $\boxed{1}$

29) $e^{2 \ln x}$

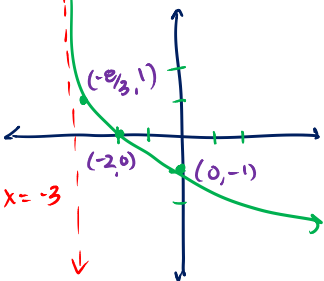
$e^{\ln x^2}$
 $\boxed{x^2}$

Sketch the graph. Show all important information (x intercept, y intercept, asymptotes).

30) $y = -\log_3(x+3)$

$y = 3^x$ \leftarrow C_F or $y = \log_3 x$ \leftarrow F_x \leftarrow L_3

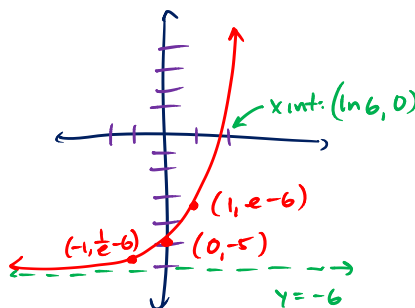
$(-1, \frac{1}{3})$	$(\frac{1}{3}, -1)$	$(\frac{1}{3}, 1)$	$(-\frac{2}{3}, 1)$
$(0, 1)$	$(1, 0)$	$(1, 0)$	$(-2, 0)$
$(1, 3)$	$(3, 1)$	$(3, -1)$	$(0, -1)$



31) $y = e^x - 6$

$y = e^x$ \leftarrow D_6

$(-1, \frac{1}{e})$	$(-1, \frac{1}{e} - 6)$
$(0, 1)$	$(0, -5)$
$(1, e)$	$(1, e - 6)$

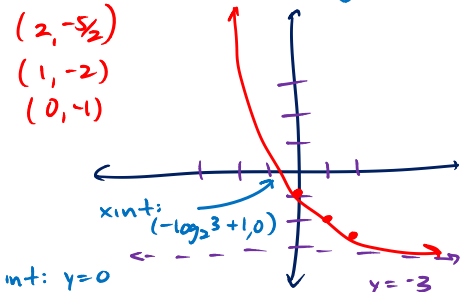


Find x int: $y = 0$
 $0 = e^x - 6$
 $e^x = 6$
 $\boxed{x = \ln 6}$

33) $y = 2^{-x+1} - 3$

$y = 2^x$ \leftarrow F_y or $y = 2^{-(x-1)} - 3$ \leftarrow D_3

- F_y : mult x by -1
- R_1 : add 1 to x
- D_3 : sub. 3 from y



Find x int: $y = 0$
 $0 = 2^{-x+1} - 3$
 $2^{-x+1} = 3$
 $\log_2 3 = -x + 1$
 $-(\log_2 3 - 1) = x$