Name: _____ Date: _____

PCH Ms. Loughran

Do Now:

1. Solve for x: $\ln(64x^3 - 1) = \ln(16x^2 + 4x + 1) + 2$

$\ln(64x^3-1) - \ln(16x^2+4x+1) = 2$

$(4x-1)(16x^2+4x+1)$

$\ln \frac{64x^3-1}{16x^2+4x+1} = 2$

$\ln 4x-1 = 2$

$e^2 = 4x-1$

$e^2+1 = 4x$

$\frac{e^2+1}{4} = x$

2. Solve for x: $\ln x = 1 - \ln 2$

$\ln x + \ln 2 = 1$

$\ln 2x = 1$

$e = 2x$

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

OR

$\ln x = 1 - \ln 2$

$\ln x = \ln e - \ln 2$

$\ln x = \ln \frac{e}{2}$

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

$2x = e$

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

Continuing in yesterday's sheet…

19. $x^{\log x} = 100x$

$\log x^{\log x} = \log(100x)$

$(\log x)(\log x) = \log 100 + \log x$

$(\log x)^2 = 2 + \log x$

let $y = \log x$

$y^2 = 2 + y$

$y^2 - y - 2 = 0$

$(y-2)(y+1) = 0$

$y = 2$ | $y = -1$

$\log x = 2$ | $\log x = -1$

$x = 10^2 = 100$ | $x = 10^{-1} = \frac{1}{10}$

21. $\log x + \frac{1}{\log x} = \frac{5}{2}$

let $y = \log x$

$2y\left(y + \frac{1}{y} = \frac{5}{2}\right)$

$2y^2 + 2 = 5y$

$2y^2 - 5y + 2 = 0$

$(2y-1)(y-2) = 0$

$y = \frac{1}{2}$ | $y = 2$

$\log x = \frac{1}{2}$ | $\log x = 2$

$x = 10^{\frac{1}{2}}$ or $\sqrt{10}$ | $x = 10^2 = 100$

23. $4^{\log_{16} 27} = 3^x$

$16^{\frac{1}{2}\log_{16} 27} = 3^x$

$16^{\log_{16} 27^{\frac{1}{2}}} = 3^x$

$27^{\frac{1}{2}} = 3^x$

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

$3^{3/2} = 3^x$

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

25. $\log 3 = x \log_2 3$

$\log 3 = x \cdot \frac{\log 3}{\log 2}$

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

$(\log 3)(\log 2) = x \log 3$

$\log 2 = x$

27. If $b = \log_3 x$, solve for x: $\log_b(\log_3 x^2) = 2$

impossible bc $b \neq 0$

$b^2 = \log_3 x^2$

$(\log_3 x)^2 = \log_3 x^2$

$(\log_3 x)^2 = 2\log_3 x$

let $y = \log_3 x$

$y^2 = 2y$ | $y(y-2) = 0$

$y^2 - 2y = 0$ | $y = 0$ | $y = 2$

$\log_3 x = 0$ | $\log_3 x = 2$

$x = 3^2 = 9$

Name:_____ Date:_____

PCH: Even More Solving Radical Equations Ms. Loughran

Do Now:

Solve for x.

1. $\left(\sqrt{x^2-6x}\right)^2 = \left(x-\sqrt{2x}\right)^2$

$x^2 - 6x = x^2 - 2x\sqrt{2x} + 2x$

$-8x = -2x\sqrt{2x}$

$4x = x\sqrt{2x}$

$16x^2 = x^2(2x)$

$16x^2 = 2x^3$

$0 = 2x^3 - 16x^2$

$0 = 2x^2(x-8)$

$x = 0, 8$

$x^2 - 6x \geq 0$

$x(x-6) \geq 0$

0 | 6

$2x \geq 0$

$x \geq 0$

$x - \sqrt{2x} \geq 0$

$x \geq \sqrt{2x}$

$x^2 \geq 2x$

$x^2 - 2x \geq 0$

$x(x-2) \geq 0$

0 | 2

final restrictions:

$\{0\} \cup [6, \infty)$

Classwork:

Homework 03-20

Name:_____ Date:_____
PCH: More Practice with Exponentials and Logs HW Ms. Loughran

1. Use the change of base formula to identify the expression that is equivalent to $\log_3 10$.

$= \frac{\log 10}{\log 3} = \frac{1}{\log 3}$

(a) $\frac{\ln 3}{\ln 10}$ (b) $10\log 3$ (c) $\ln\frac{10}{3}$ (d) $\frac{1}{\log 3}$ (e) None of these

2. Simplify: $3e^{2\ln x}$ $= 3e^{\ln x^2} = 3x^2$

(a) 3^x (b) $3xe^2$ (c) $3x^2$ (d) $\ln x^3$ (e) None of these

3. Which of the following equations is not true?

(a) $b^{\log_b c} = c$ (b) $\log_1 b = b$ (c) $\log_b b = 1$
(d) All of these equations are false. (e) All of these equations are true.

4. Simplify: $\ln\sqrt[4]{e^3 x}$ $= \ln(e^3 x)^{\frac{1}{4}} = \frac{1}{4}\ln(e^3 x) = \frac{1}{4}(\ln e^3 + \ln x) = \frac{1}{4}(3\ln e + \ln x) = \frac{1}{4}(3+\ln x)$ $= \frac{3}{4} + \frac{1}{4}\ln x$

6

(a) $\frac{3}{4}+\frac{1}{4}\ln x$ (b) $\frac{3}{4}+\ln\frac{3}{4}$ (c) $\frac{3e}{4}+\frac{1}{4}\ln x$ (d) $\frac{3e}{4}+\ln\frac{x}{4}$ (e) None of these

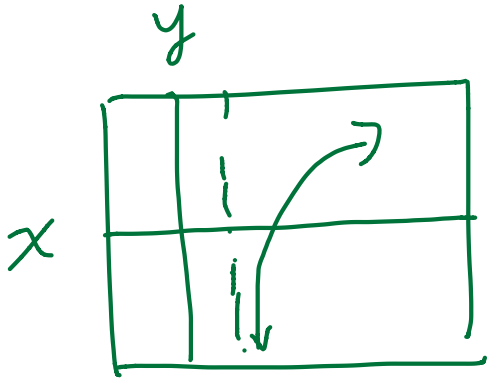
5. Find the vertical asymptote: $f(x) = \ln(x+2)$.

$x+2=0$
$x=-2$

(a) $x = 2$ (b) $x = 0$ (c) $y = 2$ (d) $x = -2$ (e) None of these

6. Match the graph with the correct function.

(a) $f(x) = e^x$ (b) $f(x) = e^{x-1}$
(c) $f(x) = \ln x$ (d) $f(x) = \ln(x-1)$
(e) None of these.



right one

7. Solve for x: $\ln(7-x)+\ln(3x+5)=\ln(24x)$

$\ln(7-x)(3x+5)=\ln(24x)$

$-3x^2+16x+35=24x$

$0=3x^2+8x-35$

$0=3x^2+15x-7x-35$

$0=3x(x+5)-7(x+5)$

$(3x-7)(x+5)=0$

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

8. Solve the equation for x: $(\ln x-2)^3-4(\ln x-2)=0$

$y=\ln x-2$

$y^3-4y=0$

$y(y^2-4)=0$

$y(y-2)(y+2)=0$

$y=0$ | $y=2$ | $y=-2$

$\ln x-2=0$ | $\ln x-2-2=0$ | $\ln x-2+2=0$

$\ln x=2$ | $\ln x-4=0$ | $\ln x=0$

$x=e^2$ | $\ln x=4$ | $e^0=x$

$x=e^4$ | $1=x$

9. Evaluate each of the following:

(a) $\log_8 32+\log_{27} 9=\frac{\log 32}{\log 8}+\frac{\log 9}{\log 27}=\frac{5\log 2}{3\log 2}+\frac{2\log 3}{3\log 3}=\frac{5}{3}+\frac{2}{3}=\frac{7}{3}$

(b) $(\log_{32} 25)(\log_5 8)=\frac{\log 25}{\log 32}\cdot\frac{\log 8}{\log 5}=\frac{2\log 5}{5\log 2}\cdot\frac{3\log 2}{\log 5}=\frac{6}{5}$

10. If $\log 3=a$ and $\log 5=b$, rewrite $\log(\frac{50}{3})$ in terms of a and b.

$\log\left(\frac{5\cdot 10}{3}\right)$

$\log 5+\log 10-\log 3$

$b+1-a$

11. Solve $\log_3(\log_2(\log_4 x))=0$

$3^0=\log_2(\log_4 x)$

$1=\log_2(\log_4 x)$

$2^1=\log_4 x$

$2=\log_4 x$ $\quad x=16$

$4^2=x$