

Homework 03-26

Name: _____
PCH: Post Exam Practice

Date: _____
Ms. Loughran

1. Solve for x : $\log_{\frac{1}{3}} \frac{2x+3}{x+1} = -2$

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

$$2x+3 = 9x+9$$
$$-6 = 7x$$
$$-\frac{6}{7} = x$$

2. Solve for x : $(\log_{25} 27)(\log_{81} 125) = x$

$$\frac{\log 27}{\log 25} \cdot \frac{\log 125}{\log 81}$$
$$\frac{3 \log 3}{2 \log 5} \cdot \frac{3 \log 5}{4 \log 3} = \frac{9}{8}$$

3. Solve for x : $\log_3(\log_2(\log_5 x)) = 2$

$$3^2 = \log_2(\log_5 x)$$

$$9 = \log_2(\log_5 x)$$

$$2^9 = \log_5 x$$

$$x = 5^{2^9}$$

$$x \geq 2 \quad x \geq -\frac{1}{3}$$

4. Solve for x using restriction sets:

$$\sqrt{x-2} + \sqrt{3x+1} = 3$$

$$\begin{aligned} 2x-2 &\geq 0 \\ 2x &\geq 2 \\ x &\geq 1 \end{aligned}$$

$$x-2+3x+1+2\sqrt{3x^2-5x-2} = 9$$

$$4x-1+2\sqrt{3x^2-5x-2} = 9$$

$$2\sqrt{3x^2-5x-2} = -4x+10$$

$$\sqrt{3x^2-5x-2} = -2x+5$$

$$3x^2-5x-2 = 4x^2-20x+25$$

$$0 = x^2-15x+27$$

$$x = \frac{15 \pm \sqrt{225-4(1)(27)}}{2}$$

$$x = \frac{15 \pm \sqrt{117}}{2}$$

$\frac{15+\sqrt{117}}{2}$ reject
 $\frac{15-\sqrt{117}}{2}$

$$\begin{aligned} \therefore 2 &\leq x \leq \frac{5}{2} \\ -2x+5 &\geq 0 \\ -2x &\geq -5 \\ x &\leq \frac{5}{2} \end{aligned}$$

5. Solve for x : $\log_2(2x+3) = -1 + \log_2(x-1)$

$$\log_2(2x+3) - \log_2(x-1) = -1$$

$$\log_2 \frac{2x+3}{x-1} = -1$$

$$\frac{1}{2} = \frac{2x+3}{x-1}$$

$$x-1 = 4x+6$$

$$-7 = 3x$$

$$-\frac{7}{3} = x \quad \emptyset$$

6. Rewrite in terms of $\log A$, $\log B$, and $\log C$: $\log \sqrt[4]{\frac{(AB^3)^4}{C}}$

$$\log \left(\frac{A^4 B^{12}}{C} \right)^{\frac{1}{4}}$$

$$\frac{1}{4} (4 \log A + 12 \log B - \log C)$$

7. Solve for x : $\log_3(64x^3 + 27) - \log_3(16x^2 - 12x + 9) = 3$

$$\log_3 4x + 3 = 3$$

$$27 = 4x + 3$$

$$24 = 4x$$

$$x = 6$$

8. Solve for x : $\ln(x+2) - \ln(4-x) = 2$

$$\ln \frac{x+2}{4-x} = 2$$

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

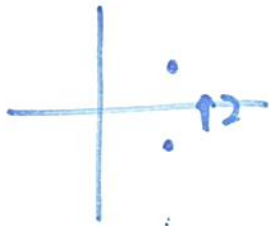
$$4e^2 - xe^2 = x + 2$$

$$4e^2 - 2 = x + xe^2$$

$$4e^2 - 2 = x(1 + e^2)$$

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

9. A parabola has vertex $(4, -1)$ and focus $(4, 1)$. Write the equations of the parabola, the directrix and the axis of symmetry.



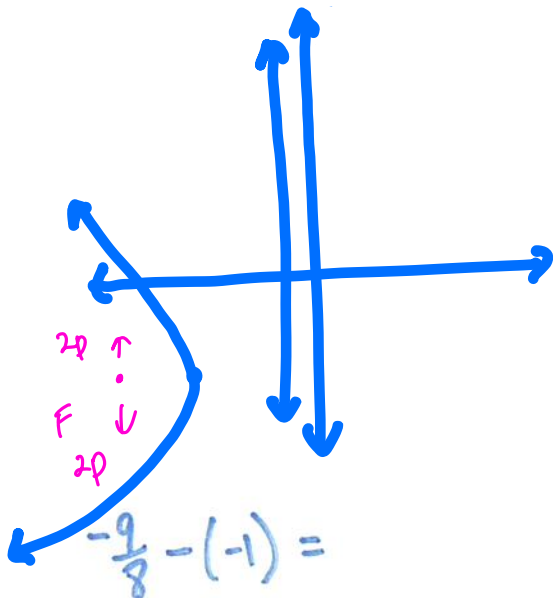
$$p = 1 - (-1) = 2$$

Equation: $8(y+1) = (x-4)^2$

Directrix: $y = -3$

Axis of Symmetry: $x = 4$

10. A parabola has a directrix $x = -\frac{7}{8}$ and vertex at $(-1, -5)$. Write the equation of the parabola, make a sketch of the parabola (including 2 additional points), and state the coordinates of the focus.



Equation: $(y+5)^2 = -\frac{1}{2}(x+1)$

Focus: $(-\frac{9}{8}, -5)$

Coordinates of Additional Points: $(-\frac{9}{8}, -4.75)$, $(-\frac{9}{8}, -5.25)$

$$-\frac{9}{8} - (-1) =$$

$$-\frac{9}{8} + 1 = -\frac{1}{8}$$

$$4(-\frac{1}{8}) = -\frac{1}{2}$$

11. Solve for x using restriction sets:

$$2x = 1 - \sqrt{2-x}$$

$$2x - 1 = -\sqrt{2-x}$$

$$\star -2x + 1 = \sqrt{2-x}$$

$$4x^2 - 4x + 1 = 2 - x$$

$$4x^2 - 3x - 1 = 0$$

$$(4x + 1)(x - 1) = 0$$

$$x = -\frac{1}{4} \quad x = 1 \quad \text{reject}$$

$$2-x \geq 0$$

$$-x \geq -2$$

$$x \leq 2$$

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

$$-2x + 1 > 0$$

$$-2x > -1$$

$$x < \frac{1}{2}$$

12. Solve for x : $(\ln x - 3)^3 + (\ln x - 3)^2 = 9(\ln x - 3) + 9$

$$t^3 + t^2 - 9t + 9 = 0$$

$$t^2(t+1) - 9(t+1) = 0$$

$$(t^2 - 9)(t+1) = 0$$

$$t = \pm 3$$

$$t = -1$$

$$\ln x - 3 = 3$$

$$\ln x = 6$$

$$x = e^6$$

$$\ln x - 3 = -3$$

$$\ln x = 0$$

$$x = 1$$

$$\ln x - 3 = -1$$

$$\ln x = 2$$

$$x = e^2$$

13. Find the domain and range of each of each of the following functions:

(a) $y = \ln(x+2) - 3$ D: $x > -2$ R: \mathbb{R}

(b) $y = \ln(x-3) + 2$ D: $x > 3$ R: \mathbb{R}

(c) $y = e^{x+2} - 3$ D: \mathbb{R} R: $y > -3$

(d) $y = e^{x-3} + 2$ D: \mathbb{R} R: $y > 2$

