

All students taking **Pre-Calculus Honors:**

Complete this summer packet and return it on the first day of school. Show all of your work neatly on separate paper. **DO NOT use a calculator!**

Find all real solutions, if any, of each equation.

1.  $\frac{3x}{4} - \frac{x}{3} = \frac{1}{12}$

7.  $\sqrt{2x-1} - \sqrt{x-5} = 3$

2.  $\frac{1-3x}{4} = \frac{x+6}{3} + \frac{1}{2}$

8.  $\sqrt{x+1} + \sqrt{x-1} = \sqrt{2x+1}$

3.  $(x-1)(2x+3) = 3$

9.  $|2x+3| = 7$

4.  $5x = 4x^2 + 1$

10.  $4^{1-2x} = 16$

5.  $\sqrt[3]{x-1} = 2$

11.  $e^{1-x} = 0$

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

Solve each inequality. Graph the solution set.

12.  $\frac{2x-3}{5} + 2 \leq \frac{x}{2}$

14.  $|2x-5| \geq 5$

13.  $-9 \leq \frac{2x+3}{-4} \leq 7$

15.  $|1-2x| < \frac{1}{3}$

Find an equation of the line having the given characteristics. Express your answer in **both** general form and the slope-intercept form of the equation of a line.

16. Slope = -2; containing the point (3, -1).

17. Slope = 0; containing the point (-5, 4).

18. Slope undefined; containing the point (-3, 4).

19. Parallel to the line  $2x - 3y = -4$ ; containing the point (-5, 3).

20. Perpendicular to the line  $x + y = 2$ ; containing the point (4, -3).

21. Containing the points (3, -4) and (2, 1).

Find the center and radius of each circle. Graph each circle by hand.

22.  $x^2 + y^2 - 2x + 4y - 4 = 0$

23.  $3x^2 + 3y^2 - 6x + 12y = 0$

24. For the function  $f(x) = \frac{3x}{x^2 - 4}$  find the following:

- a)  $f(-x)$       b)  $-f(x)$       c)  $f(x+2)$       d)  $f(x-2)$       e)  $f(2x)$

Name the type of function, sketch a graph and find all the following: domain, range, intercepts, and  $f(2)$ .

25.  $f(x) = 3x^2 + 2x - 8$

26.  $y = |2x + 1|$

27.  $g(x) = \sqrt{x-1} + 4$

28.  $y = (x-1)(2x+3)(x+5)$

29.  $f(x) = \log_2 x$

30.  $y = 2^x$

Simplify each

31.  $\sqrt{48} + 8\sqrt{75}$

32.  $\frac{\sqrt{7}}{\sqrt{3}}$

33.  $(3\sqrt{2})^2$

34.  $\sqrt{\frac{1}{10}}$

35.  $\sqrt[3]{\frac{8}{27}}$

36.  $\frac{1}{5-\sqrt{7}}$

37.  $\frac{3}{2\sqrt{3}+5\sqrt{2}}$

38.  $\frac{3}{\sqrt{2}}$

Solve each equation in the complex number system.

39.  $x^2 + x + 1 = 0$

40.  $3x^2 - 2x - 1 = 0$

Evaluate each expression

41.  $\log_3^{81}$

43.  $\log 10$

42.  $\log 0$

44.  $\ln e$

Write each expression as a sum and/or difference of logarithms.

45.  $\log(u^2v^3)$

46.  $\log\left(\frac{a}{b^2}\right)$

Write each expression as a single logarithm.

47.  $3\log u + 4\log v$

48.  $2\log(5x^3) - \frac{1}{2}\log(2x+3)$

Simplify the following expressions to the lowest term.

49.  $\left(\frac{x}{x-1}\right) \times \left(\frac{x+1}{x^2}\right) \div (x^2-1)$

50.  $\frac{\frac{x^2+2x-3}{x^2-4}}{\frac{x^2+7x+6}{x+2}}$

Find the **exact** value of the following trigonometric functions.

51.  $\sin 60^\circ$

52.  $\tan 45^\circ$

53.  $\cos 45^\circ$

54.  $\cot 30^\circ$

Obtain an equation of the conic described.

55. Parabola; focus at (-2, 0); directrix the line  $x=2$ .

56. Circle; center at (4, -3); radius = 5.

Solve each system of equations. Use either substitution or elimination.

57. 
$$\begin{aligned} 2x + 3y &= 6 \\ x - y &= \frac{1}{2} \end{aligned}$$

58. 
$$\begin{aligned} y &= 4x - 1 \\ y &= (x-2)^2 + 2 \end{aligned}$$