Name: _____ Period_____

REQUIRED Pre-requisite Summer Packet for Precalculus and Advanced Precalculus

This packet represents the basic skills that you should have entering into a precalculus course. All work should be done with either no calculator, or at most, a 4-function calculator. All trigonometry problems should be completed WITHOUT the use of a unit circle. You will be assessed on this material within the first two weeks of school.

A basic understanding of graphs (your "library of functions" from Algebra 2) is also required. This includes basic appearance, transformations of, and information about the following graphs:

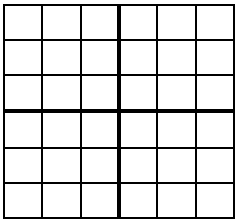
$y = x$ $\quad y = x^2$ $\quad y = x^3$ $\quad y = |x|$ $\quad y = \ln x$ $\quad y = \log x$ $\quad y = e^x$

$y = \sin\theta$ $\quad y = \cos\theta$ $\quad y = \tan\theta$ $\quad y = \sqrt{x}$ $\quad y = \sqrt[3]{x}$ $\quad y = \frac{1}{x}$ $\quad y = \frac{1}{x^2}$

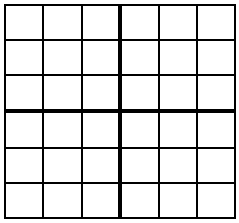
Space is provided to work on these pages, but if you prefer, you can use your own loose-leaf paper.

Graph each of the following:

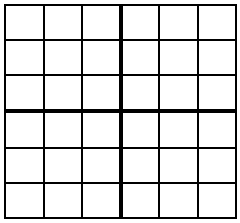
1. $2x - 4y = 8$



2. $y \le -x$



3. $y \ge -|x| + 2$

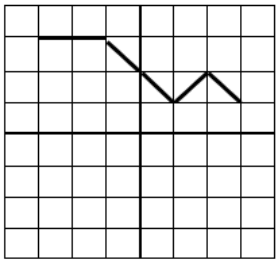


4. Find the slope-intercept form of the equation for the line through $(4,8)$ and parallel to $y = -3x - 1$.

5. Solve by completing the square: $2x^2 - 12x + 4 = 0$

6. A. Give the domain of the given function in interval notation.

   B. Give the range of the given function in interval notation.



7. Write an equation of the line through the points (1,9) and (-1,4) in slope-intercept form.

8. Simplify: $(3-6i)(4-i)$

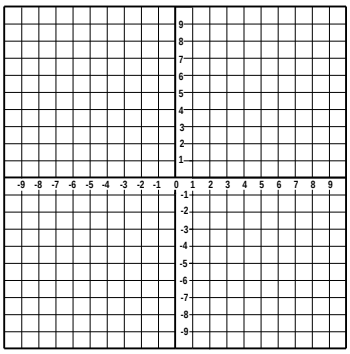
9. Simplify: $\sqrt{-36}+\sqrt{-9}$

10. Factor each expression:

A. $3x^3-12x$ B. x^4+7x^2-30 C. $6x^3+5x^2-4x$

11. Solve: $2|2x+5|-6=16$

12. Identify the vertex and y-intercept of the function and graph: $y=-3x^2+6x-8$



13. Find the real solutions: $8x^3-1=0$

14. Solve the system: $\begin{cases} 5x-3y=23 \\ 2x+y=7 \end{cases}$

15. Find all solutions (real & complex): $x^4-3x^3-3x^2-3x-4=0$ (HINT: Think $\frac{p}{q}$)

16. Find the remainder for $\left(x^4-6x^2+3x-1\right)\div\left(x-2\right)$ (HINT: Use synthetic division)

17. Write an equation of the line perpendicular to the *x*-axis through the point (3, -5).

18. Solve: $|3x-1|>4$

19. Solve by factoring: $12x^2-17x=40$

20. Factor each expression completely:

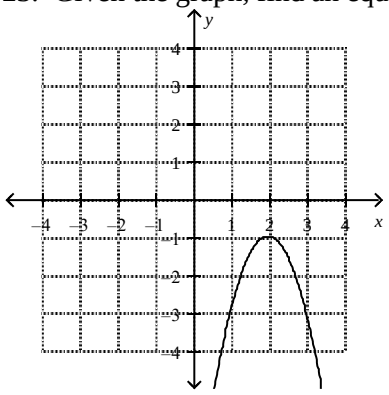
A. $3x^2+11x-20$

B. x^4-10x^2+9

21. Find all solutions (real & complex): $x^3+1=0$

22. Write a polynomial function with zeros of 3, -1 and 2.

23. Given the graph, find an equation of the parabola in vertex form.



24. Solve for a: $2a+6=ka-h$

25. Find all solutions (real & complex): $49x^2+25=0$

26. Given the matrices $A=\begin{bmatrix}12 & -5\\ 0 & 3\end{bmatrix}$ and $B=\begin{bmatrix}-7 & 4\\ 9 & -8\end{bmatrix}$, find

a) $A+2B$ b) the determinant of B

27. Solve: $x=\sqrt{x+6}$.

28. Given that $f(x)=x+3$, and $g(x)=x^2+x-6$, find $\frac{g(x)}{f(x)}$ and state the domain of $\frac{g(x)}{f(x)}$.

29. Given $f(x)=\sqrt{2x-3}$, find the inverse of f.

30. Solve without a calculator: $2^{y+3}=16^{y}$

31. Simplify. Your answer should only contain positive exponents.

$$\left(\frac{x^{-2}y^{-4}}{4x^{3}y^{-7}}\right)^{-2}$$

32. Solve: $\log_3(x+5)+\log_3(x-3)=2$

33. Solve: $\dfrac{4}{x+3}=\dfrac{8}{x^2-9}$

34. Show your work to verify: $\sin\theta\cot\theta\sec\theta=1.$

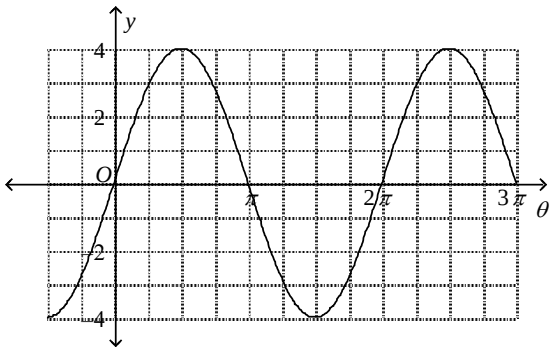
For problems 35-36, solve each equation on the interval $0\le\theta<2\pi$***:***

35. $\sqrt{2}\cos\theta-1=0$

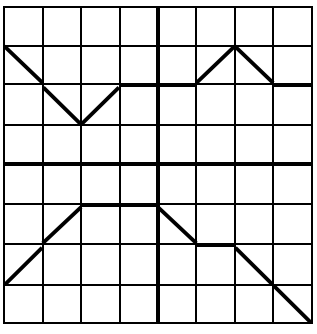
36. $\cos^2\theta+\cos\theta-6=0$

37. Find the exact value of $\tan 315°$

38. Find the amplitude and period for the graph.



39. For the graphs of $f(x)$ (*upper*) and $g(x)$ (*lower*) shown, find



A. $f(g(1))$

B. $(f+g)(2)$

C. $(g-f)(-1)$

40. If $f(x)=3x-4$ and $g(x)=7x-1$, find $f(g(x))$.

41. Simplify without a calculator: $27^{4/3}$

42. Evaluate: $\log_5 \sqrt{5}$

43. Evaluate: $\log_5 \frac{1}{5}$

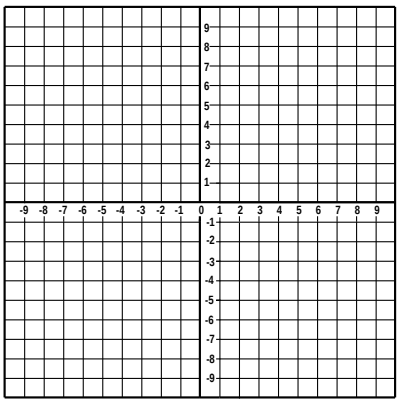
44. Evaluate: $\ln e^9$

45. Divide and state any restrictions: $\frac{x^2-5x+4}{x^2+3x-28} \div \frac{x^2+2x-3}{x^2+10x+21}$

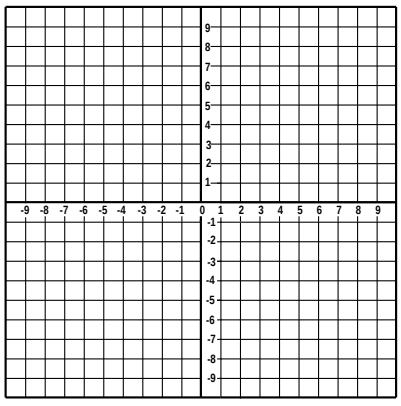
46. Simplify: $\frac{4}{x^2-5x+4} - \frac{2}{x^2-16}$

47. Identify any holes, vertical or horizontal asymptotes for the given rational functions. Then sketch their graphs:

a. $y=\frac{x+7}{x^2-49}$



b. $y=\frac{x^2-x-12}{x^2-2x-15}$



48. Change $\frac{\pi}{5}$ radians to degrees.

49. Find 2 coterminal angles, one positive and one negative, for $\frac{3\pi}{8}$

50. Factor: $8x^3 - 27$

51. Simplify: $csc\theta(sin\theta + cos\theta cot\theta)$

52. Evaluate without a calculator: $sin\frac{19\pi}{6}$

53. Evaluate without a calculator: $sec\frac{7\pi}{4}$

54. Evaluate without a calculator: $csc\frac{19\pi}{6}$

55. Evaluate without a calculator: $cot\frac{21\pi}{3}$

56. Evaluate without a calculator: $cos\frac{-2\pi}{3}$

57. Evaluate without a calculator: $tan\frac{4\pi}{3}$

58. Solve: $2cos^2\theta + cos\theta = 1$ on $[0, 2\pi)$

59. Solve: $4sin^2\theta - 3 = 0$ on $[0, 2\pi)$.

60. Given the points $(3,-8)$ and $(-5,11)$,

a. find the midpoint

b. find the distance between the points

61. $h(x)=\begin{cases}-2x-2 & \text{if} \quad x\le 0\\ 4-x, & \text{if} \quad x>0\end{cases}$

Evaluate and graph: a. $h(3)$ b. $h(0)$