

Pre-Calculus Honors Summer Packet

Welcome to Pre-Calculus Honors!

This packet has been designed to refresh your math skills for the rigor and pace of this course. It is important for you to make sure you fully understand these concepts and can demonstrate your understanding. Utilize online resources such as Khan Academy or other math tutorials on YouTube for guidance as needed.

This assignment is due on the first day of class. You must show all work (in pencil!) to receive full credit. This packet should be completed without the use of a calculator unless otherwise stated. Use your calculator as a tool to verify answers when applicable.

The material included in this summer assignment is essential for understanding fundamental concepts of trigonometry and pre-calculus and will be utilized extensively throughout the curriculum.

Feel free to email Mrs. Kendra Pitkin with any questions! kpitkin@theproutschool.org

Simplify. Rationalize the denominator where appropriate. leave all exponents positive.

1. $-2\sqrt{72}$

2. $\sqrt{\frac{1}{2}}$

3. $(\sqrt{14})^2$

4. $\frac{4\sqrt{2}}{5} - \frac{3}{\sqrt{2}}$

5. $\frac{4}{2+\sqrt{7}}$

6. $\sqrt{-100}$

7. $(3 + 2\sqrt{5})^2$

8. $\sqrt{\frac{-x}{5}} \cdot \sqrt{\frac{-20}{x}}$

9. $x^4(-2x)^3(6x^0)^{-2}$

Factor completely:

10. $x^3 - 7x^2 + 6x$

11. $3x^2 - 75$

12. $x^3 - y^3$

13. $25 + 10x + x^2$

14. $16x^2 - 24x + 9$

15. $6x^2 - 10x - 4$

Solve by factoring:

16. $5x^2 - 37x + 14 = 0$

17. $90x^4 = 10x^2$

Solve using the quadratic formula:

18. $3x^2 + x = 1$

Solve by completing the square:

19. $x^2 - 2x - 5 = 0$

Simplify the rational expressions.

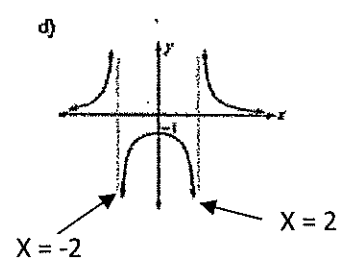
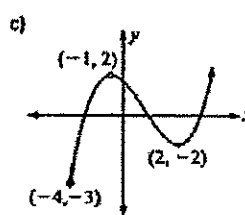
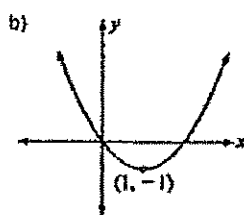
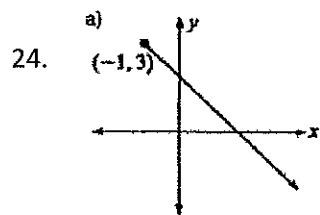
20. $\left(\frac{x^2 + 2x - 3}{x + 2}\right)\left(\frac{x^2 + 2x}{x^2 - 1}\right)$

21. $\frac{3}{1-x} + \frac{5}{1+x}$

22. $\frac{x}{3} - \frac{5}{2} = -\frac{3}{x}$

23. $\frac{4x-1}{x+1} = x - 1$

For each of the following, find the domain and range without using a calculator.



Name all the values of x that are in the domain of the given function. Give the answer in interval notation.

25. $f(x) = \frac{x-2}{x+4}$

26. $f(x) = \sqrt{x^2 - 25}$

27. $f(x) = \frac{x^2 + 3x - 10}{x^2 - 25}$

State the inverse of each function. Tell whether the inverse is a function. Write yes or no.

28. $f(x) = 3x + 7$

29. $f(x) = x^5$

30. $f(x) = x^2 + 4$

For #31 and #32, use $f(x) = \frac{2}{x+4}$ and $g(x) = x^2 - 2$ to find each function.

31. $f(-5)$

32. $g^{-1}(x)$

33. Given $f(x) = 2x + 5$, find:

a. $f(x + 3)$

b. $f(f(x))$

c. $f(x + 1) - f(x)$

34. Write the equation of the line containing the points $(-3, 4)$ and $(6, -7)$ in slope intercept and point slope form.

35. For each pair of functions, describe the transformations that would transform $f(x)$ into $g(x)$.

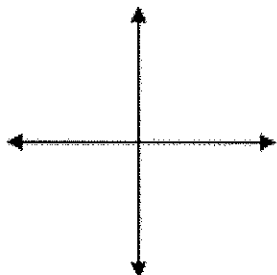
a) $f(x) = x^2$;
 $g(x) = (x - 5)^2 + 2$

b) $f(x) = \sqrt{x}$;
 $g(x) = \sqrt{3x} - 10$

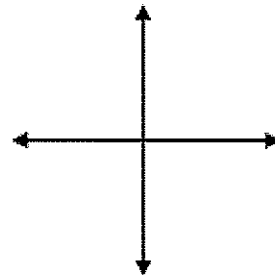
c) $f(x) = e^x$;
 $g(x) = -5(e)^{x-1}$

36. The following are graphs you should be able to sketch quickly and accurately without a calculator. Sketch each below. Label at least two points.

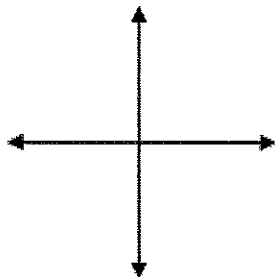
G1: $y = x$



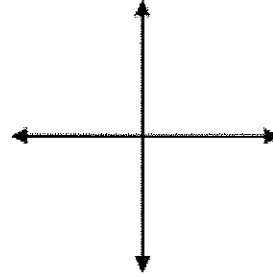
G2: $y = 3$



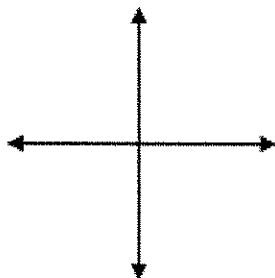
G3: $y = x^2$



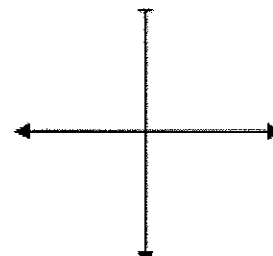
G4: $y = x^3$



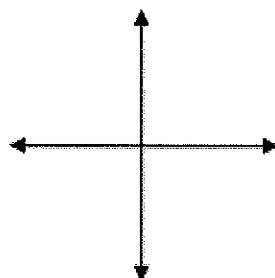
G5: $y = |x|$



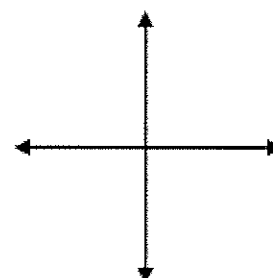
G6: $y = \frac{1}{x}$ *show asymptotes



G7: $y = \sqrt{x}$

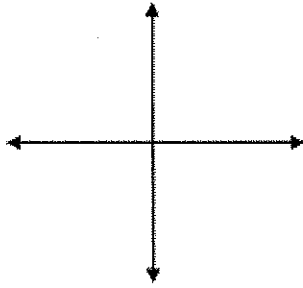


G8: $y = \sqrt[3]{x}$

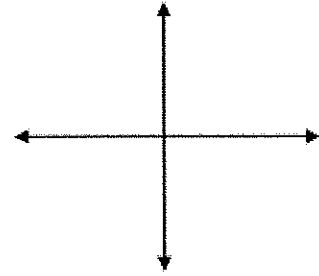


37. For G9 and G10: Draw asymptotes as a dotted line and label at least two points on the graph.

G9: $y = e^x$

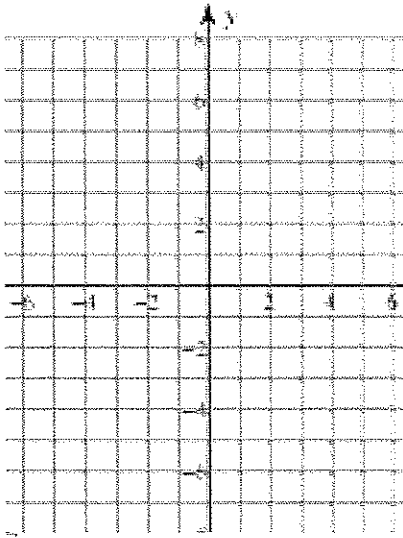


G10: $y = \ln x$

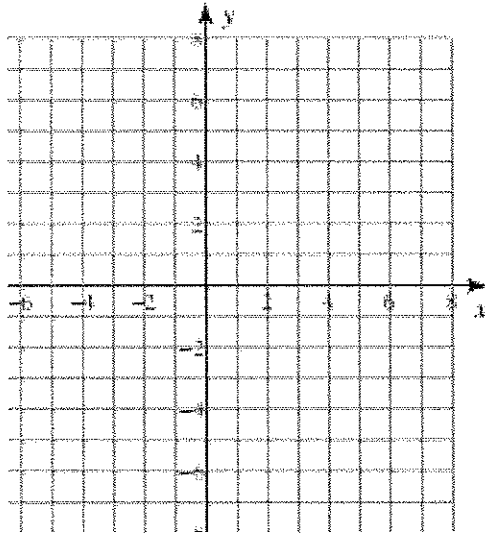


38. Section G: Graph each function, clearly showing its key features (maxima, minima, and intercepts). Identify its domain and range. (Remember: No calculator!)

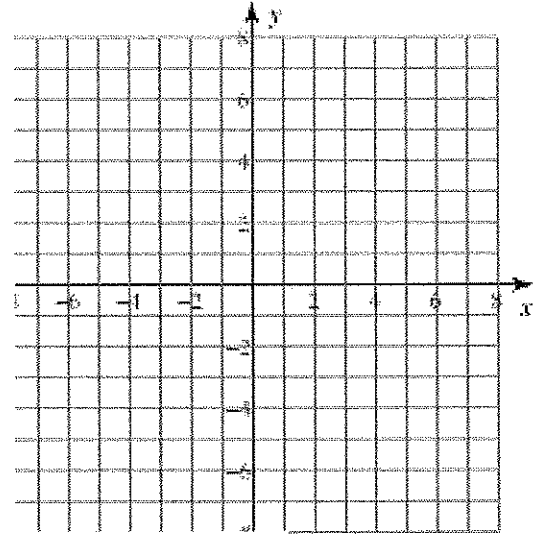
a) $f(x) = x^2 - 5$



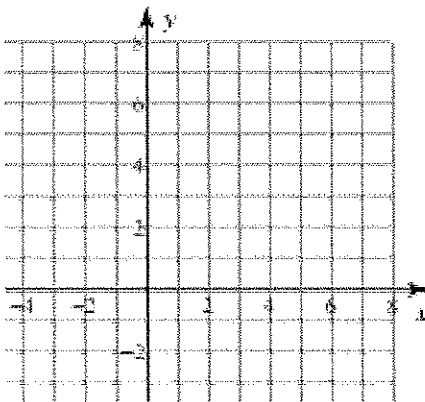
b) 2. $f(x) = 3x - 4$



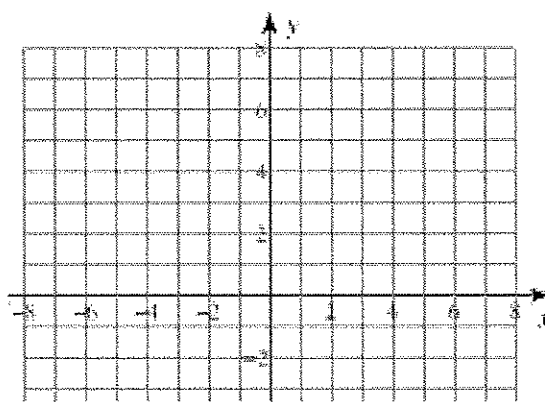
c) 3. $f(x) = x^3 + 1$



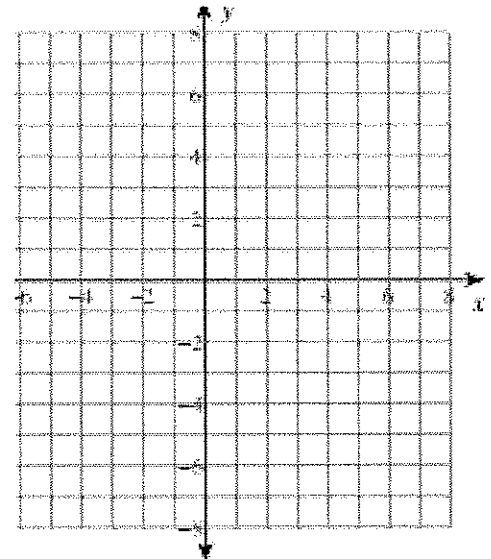
$f(x) = \sqrt{x + 6}$



5. $f(x) = |x - 1| + 3$



6. $f(x) = 2^x - 4$



39. Solve for x :

a. $\log_3 9 = x$

b. $\log_x 8 = \frac{3}{2}$

c. $\log_2 x = 3$

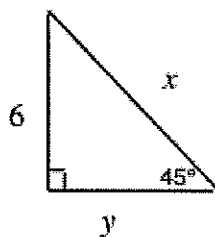
d. $\ln e^x = 4$

e. $8^{x+3} = \frac{1}{4}$

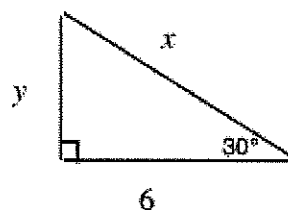
f. $27^{x+1} = 9^{2x-4}$

40. Find the missing sides in each. Give exact answers.

a.



b.



41. Evaluate each without a calculator.

1. $\sin 60^\circ$

2. $\tan 90^\circ$

3. $\sin \pi$

4. $\tan\left(\frac{\pi}{3}\right)$

5. $\cos\left(\frac{7\pi}{6}\right)$

6. $\cos(-45^\circ)$

7. $\tan 135^\circ$

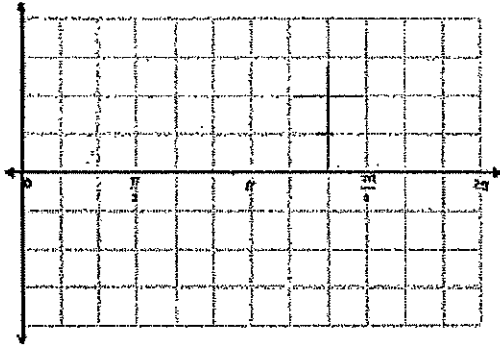
8. $\cos 300^\circ$

9. $\sin\left(\frac{4\pi}{3}\right)$

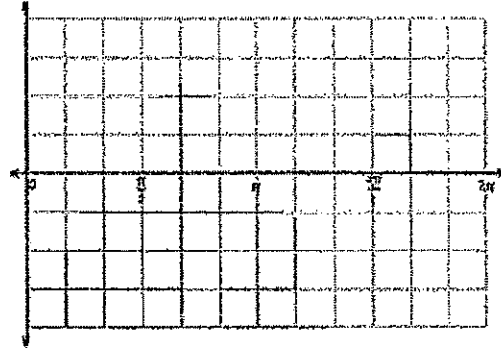
42.

Graph the functions below on the domain $0 \leq x \leq 2\pi$ (Remember: No calculator!)

1. $f(x) = \sin x$



2. $f(x) = \cos x$



43. Given $y = \frac{x^2 + 7x + 12}{x^2 - 16}$, find the following

a. x intercept(s)

b. y intercept

c. equation(s) of vertical asymptote

d. equation of horizontal asymptote

e. location of hole(s)

f. sketch the graph showing all key points

