

AP Precalculus Summer Assignment

This assignment is due on the first day of classes. You will have a quiz on this material on the first day of classes. If you have questions, contact your teacher:

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Name _____ Period _____

The purpose of this summer assignment is to review prerequisite topics for AP Precalculus. You may want to search the internet for videos or review your notes from Algebra II. Show work for all problems.

I. Complex Numbers and Factoring Review

Simplify the radical and write the complex number in standard form.

1. $-3 - \sqrt{-24}$

2. $15 + \sqrt{-96}$

3. $2 - \sqrt{-72}$

Perform the indicated operation and write the complex number in standard form.

1. $(8 - 12i) + (-6 - 29i)$

2. $(40 + 3i) - (-1 + i)$

3. $(7 - 2i)^2$

4. $(6 - 3i)(4 + 2i)$

5. $\frac{-4}{9i}$

6. $\frac{-6+i}{2+4i}$

Factor completely. Check for a GCF first!

1. $4x^2 - 25$

2. $9x^2 - 1$

3. $49x^2 - 16$

4. $x^2 - 4x - 32$

5. $x^2 - x - 42$

6. $4x^5 - 6x^3 + 8x^2$

7. $12x^2 + 10x + 2$

8. $6x^2 + 15x - 9$

9. $27 - 8y^3$

10. $x^3 - 8$

11. $x^3 + 27$

12. $64x^3 + 125$

II. Solving Quadratics Review

Solve by factoring.

1. $x^2 - 6x - 40 = 0$

2. $4x^2 - 36 = 0$

3. $3x^2 + 12x = 0$

Solve the equation by taking square roots.

1. $2x^2 - 8 = 16$

2. $(x - 5)^2 = -64$

3. $\frac{1}{2}x^2 - 8 = 16$

4. $-3(x - 3)^2 + 2 = 26$

Solve the equation by completing the square.

1. $x^2 + 20x + 50 = 0$

2. $x^2 + 14x - 15 = 0$

3. $x^2 = 18x + 40$

4. $x^2 + 2x = 49$

Solve the equation by using the quadratic formula.

1. $x^2 + 5x - 2 = 0$

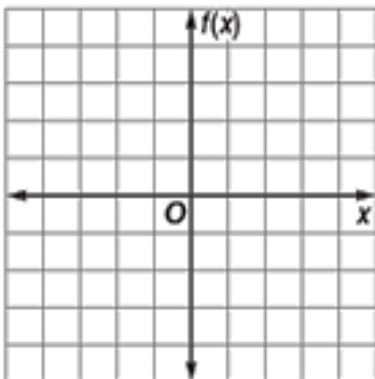
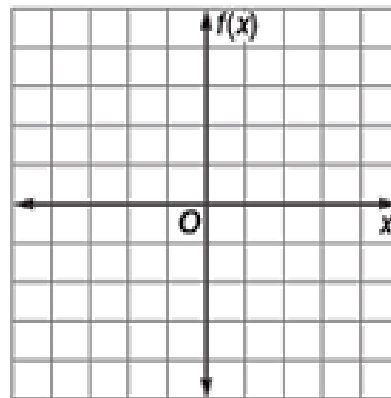
2. $2x^2 - 9x + 9 = 0$

III. Operations with Polynomial Review

Find the inverse of each function then graph the function and its inverse.

1. $f(x) = \frac{2}{3}x - 1$

2. $f(x) = \frac{1}{4}x - 2$



Find the inverse of each function.

1. $f(x) = (x + 3)^2 + 5$

2. $g(x) = \sqrt{x - 9} + 2$

Use function composition to determine if the functions are inverses.

1. $f(x) = 3x - 1$
 $g(x) = \frac{1}{3}x + \frac{1}{3}$

2. $f(x) = 2x + 5$
 $g(x) = 5x + 2$

Let $f(x) = 2x - 1$, $g(x) = 3x$, and $h(x) = x^2 + 1$. Compute the following.

1. $f(g(-3))$

2. $f(h(7))$

3. $h(g(-3))$

Let $f(x) = 9 - x$, $g(x) = x^2 + x$, and $h(x) = x - 2$. Compute the following.

1. $g(h(f(5)))$

2. $g(h(x))$

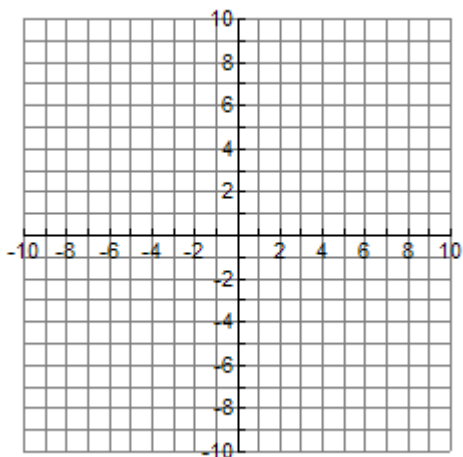
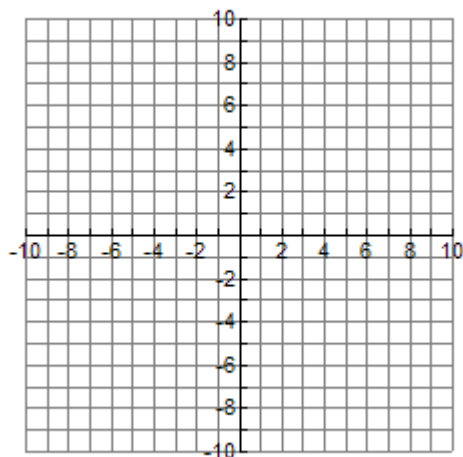
3. $g(x) - f(x)$

IV. Polynomials Review

Sketch a rough graph of each polynomial function.

1. $f(x) = -x(x - 2)(x + 4)^2$

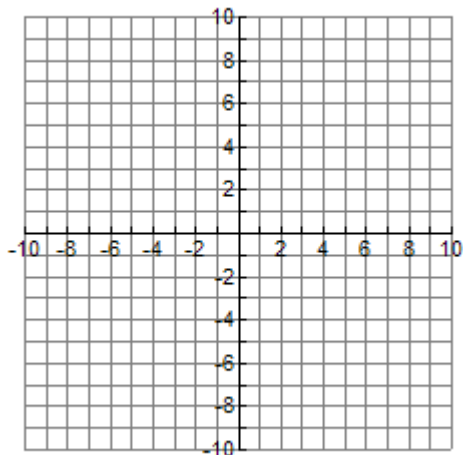
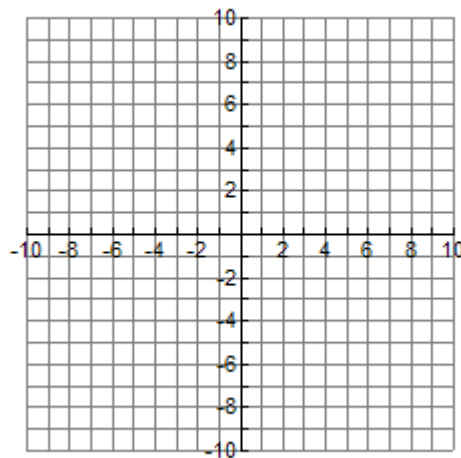
2. $f(x) = x(x + 3)(x - 5)$



Sketch a rough graph of each polynomial function, given one zero.

1. $f(x) = x^3 + 6x^2 + 3x - 10; x = -5$

2. $f(x) = x^3 - 12x^2 + 12x + 80; x = 10$



Write a least degree polynomial with a leading coefficient of 1 that has the given zeros (roots).

1. $x = -6, \pm 2$

2. $x = -5, \pm 3i$

Factor the polynomial completely, given one factor.

1. $f(x) = x^3 - 6x^2 + 5x + 12; x + 1$

2. $f(x) = x^3 - 4x^2 - 4x + 16; x - 4$

Divide using long division.

1. $(3x^4 - 5x^3 + x^2 + 7x + 12) \div (3x + 1)$

2. $(4x^4 + 3x^3 + 2x + 1) \div (x^2 + x + 2)$

Expand the following binomial using Pascal's Triangle.

1. $(c - 4d)^3$

2. $(2a + 3)^3$

3. Find the **fifth** term of $(2x - 1)^6$.

Put the equation in standard form then give the characteristics.

1. $f(x) = 6 - x^3 + 8x^2 - 3x^4$

Standard form _____

Degree _____

Type based on degree _____

Number of terms _____

Type based on terms _____

Leading coefficient _____

2. $f(x) = 16x^2 + 8x - 4$

Standard form _____

Degree _____

Type based on degree _____

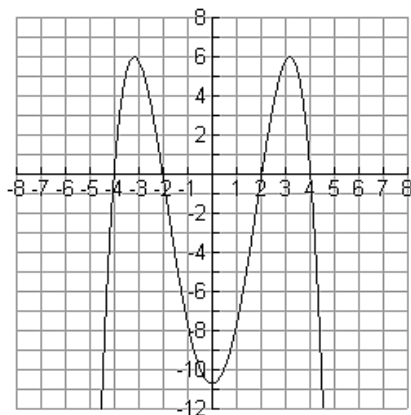
Number of terms _____

Type based on terms _____

Leading coefficient _____

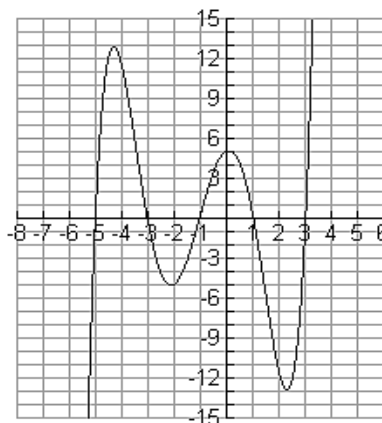
Use the graphs to determine the characteristics of the polynomial functions below.

1.



Domain: _____ Range: _____
 Left: As $x \rightarrow$ _____, $f(x) \rightarrow$ _____
 Right: As $x \rightarrow$ _____, $f(x) \rightarrow$ _____
 Max: _____ Min: _____
 Interval(s) of Increase: _____
 Interval(s) of Decrease: _____

2.



Domain: _____ Range: _____
 Left: As $x \rightarrow$ _____, $f(x) \rightarrow$ _____
 Right: As $x \rightarrow$ _____, $f(x) \rightarrow$ _____
 Max: _____ Min: _____
 Interval(s) of Increase: _____
 Interval(s) of Decrease: _____

Identify the end behavior of the following functions.

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

As $x \rightarrow$ _____, $f(x) \rightarrow$ _____

As $x \rightarrow$ _____, $f(x) \rightarrow$ _____

2. $f(x) = -x^2 + 2$

As $x \rightarrow$ _____, $f(x) \rightarrow$ _____

As $x \rightarrow$ _____, $f(x) \rightarrow$ _____

V. Rational Expressions and Rational Functions Review

Solve each equation. Check for extraneous solutions.

1. $\frac{5}{x+4} = 10$

2. $\frac{3}{x} - \frac{1}{2} = \frac{12}{x}$

3. $\frac{4}{x^2+5x} = \frac{1}{x+5}$

4. $\frac{5}{2x-2} = \frac{15}{x^2-1}$

Simplify each expression. (LIKE Denominators)

1. $\frac{x-1}{x+3} + \frac{x+7}{x+3}$

2. $\frac{6x-5}{2} - \frac{2x-3}{2}$

3. $\frac{x^2-12}{x^2+3x-54} - \frac{4x}{x^2+3x-54}$

Simplify each expression. (UNLIKE Denominators)

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

2. $\frac{7}{2x-3} - \frac{3}{2x+3}$

3. $\frac{-4}{x-5} + \frac{5}{x+3}$

Simplify each expression.

1. $\frac{x^2+7x+12}{x^2-2x-15} \cdot \frac{x^2+6x-55}{5x+20}$

2. $\frac{x^2-100}{2x+2} \div \frac{x-10}{x^2+4x+3}$

3. $\frac{x^2-9}{x^2+2x-8} \cdot \frac{x^2+9x+20}{x^2-3x}$

4. $\frac{x^2-5x+6}{x^2+7x+12} \div \frac{x^2-3x+2}{2x^4+6x^3}$

Graph the rational functions and give the characteristics.

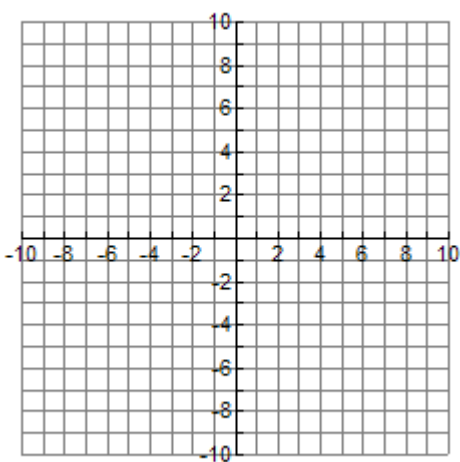
1. $f(x) = \frac{x^2 - x - 20}{x + 1}$

Vertical Asymptote(s):

Horizontal Asymptote(s):

x-int: y-int: holes:

Domain: Range:



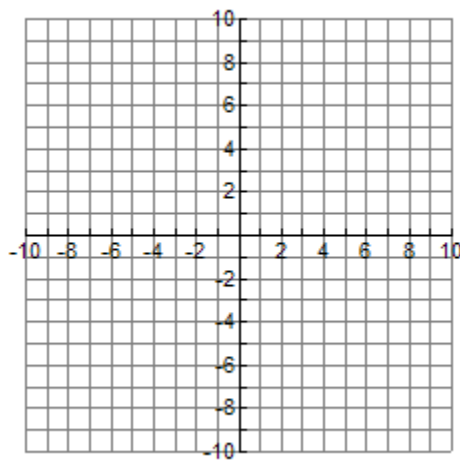
2. $f(x) = \frac{x^2 - 5x + 6}{x^2 - 4x + 3}$

Vertical Asymptote(s):

Horizontal Asymptote(s):

x-int: y-int: holes:

Domain: Range:



VI. Logarithmic Expressions and Logarithmic Functions Review

Evaluate each expression.

1. $\log_2 64$

2. $\log_4 16$

3. $\log_7 \frac{1}{343}$

4. $\log_5 1$

Condense each expression to a single logarithm.

5. $\frac{\log_2(12) + \log_2(3) + \log_2(5)}{2}$

6. $3 \log_9 x - 18 \log_9 y$

7. $\ln 2 - 10 \ln 11 - 2 \ln 7$

8. $8 \log_3 12 - 4 \log_3 11$

Expand each logarithm.

9. $\log_4(xy^6)^6$

10. $\log_5\left(\frac{u^5}{v}\right)^3$

11. $\log \frac{x}{yz^6}$

Solve each equation.

12. $\log 8 + \log 2x^2 = 2$

13. $\log x - \log (x - 3) = 2$

14. $\log(-2x - 20) = \log 2x$

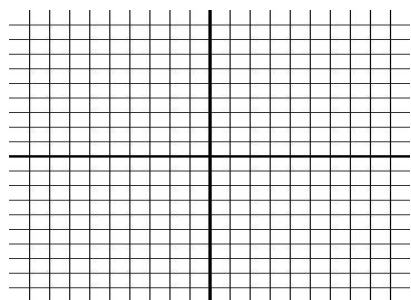
15. $4\log_4(2x - 2) = 16$

16. $\ln 4x - \log_e 7 = 3$

17. $\log(x) + \log(x + 3) = \log(x + 3)$

Identify the characteristics and the inverse of each function then sketch the graph.

18. $y = \log_2(x + 3) - 5$



Domain:

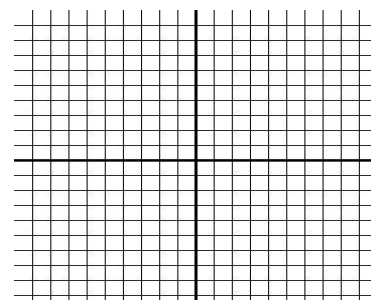
Range:

Asymptote(s):

End Behavior:

Inverse Function:

19. $y = -\log(x + 1) + 5$



Domain:

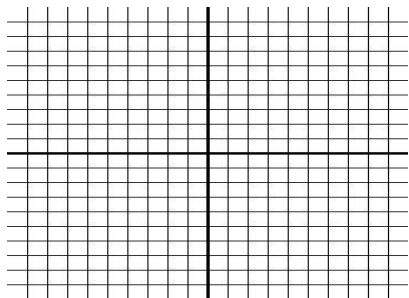
Range:

Asymptote(s):

End Behavior:

Inverse Function:

20. $y = \log_4(x - 5) + 2$



Domain:

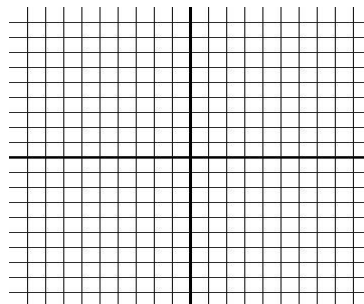
Range:

Asymptote(s):

End Behavior:

Inverse Function:

21. $y = \ln(-x) + 4$



Domain:

Range:

Asymptote(s):

End Behavior:

Inverse Function:

22. In how many years will \$100 double itself at 4% compounded annually?

23. If \$1000 is invested in an account earning 3% compounded monthly, how long will it take the account to grow in value to \$1500?

24. A house was purchased for \$110,000 in 1990. At what rate does the value of the house increase if it is worth \$407,000 in 2020?