AP PreCalc Summer Packet

Welcome to AP PreCalc! I am SO excited to work with you next school year. The AP test comes up faster than you could ever imagine, and there is SO much that needs to be covered before then. The good news is many topics build off of your algebra 2 skills- so we cannot forget those! This problem set is NOT designed to waste your summer doing math homework. Instead, my goal is for you to complete a little at a time to keep your Alg 2 knowledge fresh in your mind for when we begin PreCalculus in September.

While completed this problem set, please keep the following in mind:

- This is for you to keep these skills fresh in your mind- waiting until the last minute will only make this more challenging and time consuming!
- All answers should be exact, not rounded from a calculator (unless otherwise stated)
- All work should be shown!! Believe it or not, photo math is not allowed on the AP exam, so it is not allowed here either :)
- We will have a Mini test on these topics when we return to school in September, so treat this as your test review
- This is due on the first day of school

You are welcome to email me questions if you have them as you are working (ndallicardillo@pointpleasant.k12.nj.us). I will try to respond as quickly as I can :)

1. Evaluating Functions

For each of the following, use $f(x) = 3x^3 - x^2 + 9x$ and $g(x) = 3x$

1. Evaluate the following

$f(-2)$

$g(x) = 6$

2. Perform the following function operations

$(f/g)(x)$

$f \circ g(x)$

For each of the following, use $f(x) = |x - 2|$ and $g(x) = \sqrt{x^2 - 7}$

3. Evaluate the following

$f(-6)$

$g(x) = 3$

4. Perform the following function operations and evaluate

$(f + g)(5)$

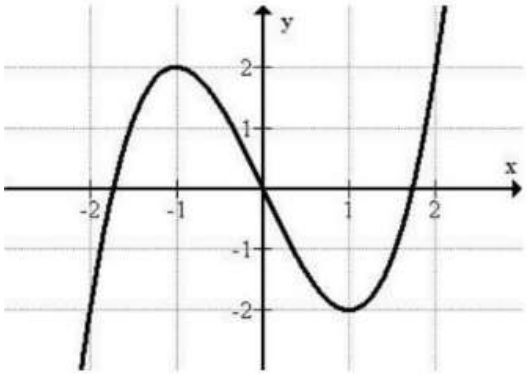
$g(f(6)$

II. Key Features

For each of the following, use the given graph/equation to determine the listed key features.

**** assume the graphs continue in either direction****

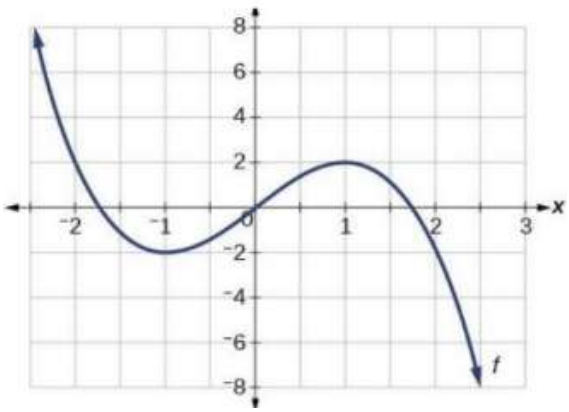
5.



a) Increasing interval(s)

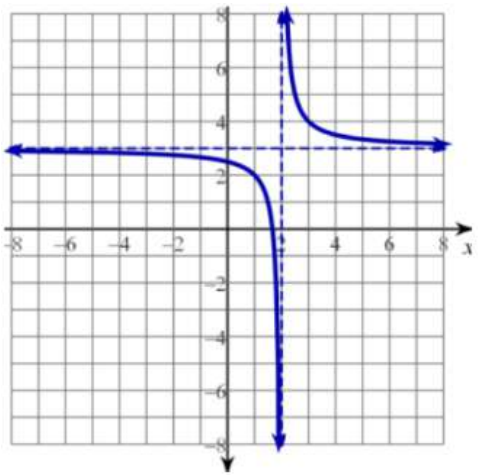
b) Decreasing interval(s)

6.



a) End behavior

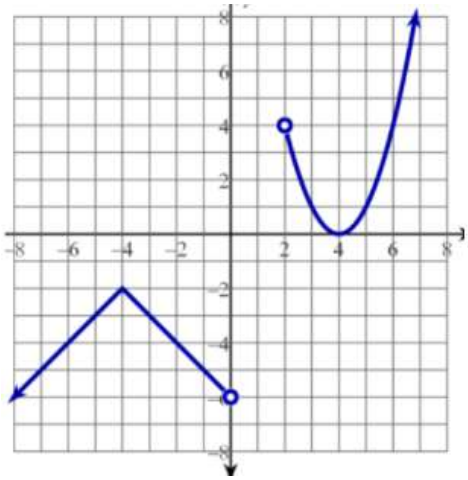
7.



a) Domain

b) Range

8.



a) Domain

b) Range

9. $f(x) = -4x^3 + 5x^2 - 2x$

a) Domain

b) Range

c) End behavior

10. $g(x) = 4(x + 1)(x - 2)$

a) x-intercept(s)

b) Y-intercept

c) End Behavior

III. Factoring

Factor each polynomial completely.

****Remember all factoring types (factoring out GCF, difference of squares, factoring by grouping, etc.)****

11. $36x^4 - 18x^3 - 9x^2$

12. $x^2 + x - 72$

13. $5x^2 - 18x + 9$

14. $3x^2 + 2x - 5$

15. $6x^2 - 7x - 3$

16. $81 - 4x^2$

17. $x^3 + 5x^2 - 9x - 45$	18. $42mc + 36md - 7n^2c - 6n^2d$
19. $x^4 - 2x^2 + 1$	20. $x^4 - 1$

IV. Rational expressions and equations
Simplify each of the following rational expressions.

21. $\frac{x^2+x-20}{x^2+2x-15}$	22. $\frac{4-x^2}{x^2+x-6}$
For the following rational functions, find the given features.	
23. $f(x) = \frac{x-2}{x^2+2x-35}$ x-intercept(s): hole(s): Vertical asymptote(s):	24. $g(x) = \frac{5+x}{25-x^2}$ x-intercept(s): hole(s): Vertical asymptotes(s):
Perform the following operations on the given rational expressions.	
25. $\frac{x^2-64}{x-8} \cdot \frac{x+5}{x^2+13x+40}$	26. $\frac{x^2-11x+30}{x-6} \div \frac{x^2-12x+35}{9x^3}$
27. $\frac{5}{x^2-4} + \frac{5x+2}{x+2}$	28. $\frac{2}{x^2+14x+48} - \frac{x}{x+6}$

V. Exponential
Use exponent rules to simplify the following expressions.
****Use positive exponents****

29. $\frac{5x^3y^9}{30x^4y^{-2}}$	30. $(\frac{2a^3b}{a^2b^2})^{-4}$
31. $(\frac{5x^7}{x^7y^6})^0$	32. $a^2 \cdot a^{x+7} \cdot a^{x-3}$
33. $(\frac{x^{3/2}}{x^{1/2}})^2$	34.$(2y^{3/4}z)(3y^{-2}y^{-1/3})$

VI. Logarithmic
Evaluate the following without the use of a calculator.

35. $log_5(625)$	36. $2log_3(\frac{1}{81}) + 5$
37. $2ln(e^5) + 1$	38. $log_6(6^5)$
Condense the following expressions into a single logarithm	
39. $2log(x) + \frac{1}{2}log(y) - 3log(x)$	40. $log(x) - log(z) - log(y) + log(w)$
Expand the following logarithms into the sum or difference of logarithms	
41. $log_5(\frac{x^2y^3}{2z^2})$	42. $ln(\frac{\sqrt{x}}{2y})$

VII. Misc. topics

The tables below represent two different functions. Classify each function as linear, quadratic, exponential, or none of the above.

43.

x	y
2	15
4	18
6	21
8	24

44.

x	y
-1	13
0	15
1	19
2	25

For each of the following, describe the transformations applied to the parent function to result in the given function

45. $f(x) = -2\sqrt{x-1}+5$

46. $g(x) = (x+1)^3 - 4$

For each of the following function, calculate the average rate of change over the given interval

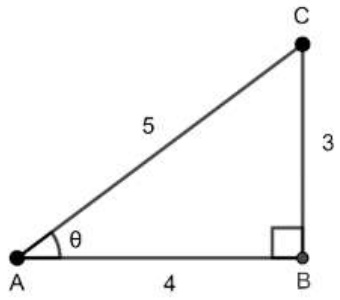
47. $f(x) = x^2 + 6x + 9$
For [-3,5]

48. $g(x) = \sqrt{x+5}$
For $-1 \le x \le 4$

Almost done! Just answer these two trig problems.

49. Write the meaning of each letter in the acronym SOH-CAH-TOA below:

50. Write the 3 trig ratios for the angle θ



All finished! Enjoy your summer, see you in September!