SAINT DOMINIC ACADEMY
MATHEMATICS DEPARTMENT

ENTERING PRECALCULUS/PRECALCULUS HONORS

2023 SUMMER PACKET

DUE ON THE FIRST DAY OF SCHOOL

DIRECTIONS

Solve all problems. Show all necessary and complete work in PENCIL.
Write legibly and as neatly as possible.

Cheating is prohibited.

CALCULATOR IS NOT ALLOWED

Name: _____ Signature: _____

PRECALCULUS/ PRECALCULUS HONORS

Summer Assignment

Please print this packet using both sides of the paper.

Name: _____

Welcome to Precalculus/Precalculus Honors! In this course you will be presented with mathematical tasks that require the application of previous course work in new and unfamiliar situations. The problems in this packet were selected to provide a sampling of concepts, skills, and solution methods with which you have experience from previous courses. Complete this packet on your own. However, you may collaborate with your peers, but be aware of your area(s) of weakness and take time to fully review the topic(s) (versus simply completing the problem.) You may find these websites useful:

http://www.purplemath.com/modules/index.htm
http://www.khanacademy.org/#browse

This packet is due on the first day of school in September. The purpose of this is to provide you feedback on your understanding of these topics and for me to know what level of algebra skills do you have.

This packet should be completed without the use of a calculator unless otherwise stated and must use pencil only. Use your calculator as a tool to verify answers when applicable. On this packet, x and y represent complex variables unless indicated otherwise. You must use the space provided for your work. Do not attempt to write your answers outside of this packet otherwise it will NOT be accepted and you will spend after school on your first day to transfer answers to the right place.

Enjoy the rest of the summer while doing this Algebra II Review Packet.

Mrs. Patrick

TOPIC A: SOLVING EQUATIONS

Solve the following equations and identify any extraneous roots if exists.

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

2. $\frac{10}{x}+3=\frac{x+9}{x-4}$

3. $(2x-1)(x-1)=(x-5)(2x-5)$

4. $t^3 = 9t^2$

5. $\sqrt{x^2 + 9} - \sqrt{x} = 3$

6. $\sqrt{3x} + \sqrt{12} = \frac{x + 5}{\sqrt{3}}$

TOPIC B: SOLVING QUADRATIC EQUATIONS

Solve the following quadratic equations using any method.

1. $2y^2 - y - \frac{1}{2} = 0$

2. $x^2 - \sqrt{5}x + 1 = 0$

3. $\sqrt{6}x^2 + 2x - \sqrt{3/2} = 0$

4. $25x^2 + 70x + 49 = 0$

TOPIC C: SOLVING INEQUALITIES

Solve the following inequalities and write your solution in interval notations.

1. $|x + 2| \geq 15$

2. $|2x + 3| < 12$

3. $x^2 > 16$

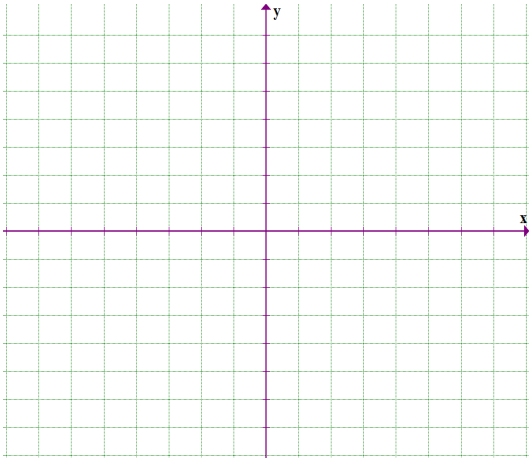
4. $\frac{x+3}{x-4} < 0$

5. $\sqrt{x^2+4} \geq 0$

TOPIC D: COORDINATE GEOMETRY

Do as indicated.

1. Draw the rectangle with vertices $A(1,3), B(5,3), C(1,-3)$ and $D(5,-3)$ on a coordinate plane. Find the area of the rectangle.



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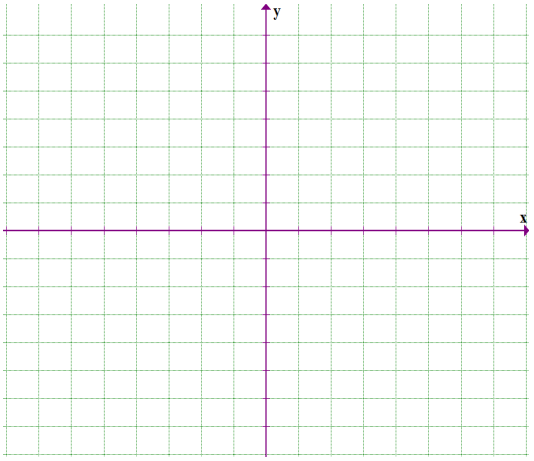
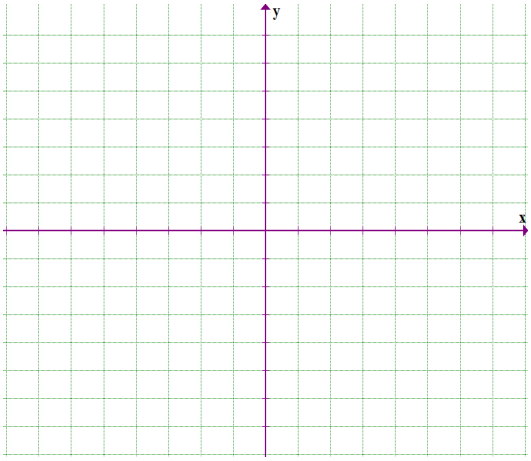
2. Plot the points $P(1,5), Q(0,6)$ and $R(-5,1)$ on a coordinate plane. Where must the point S be located so that the quadrilateral PQRS is a square? Find the area of this square.



3. Show in two ways, that is by using distance formula and slopes, that the triangle with vertices $A(6,-7), B(11,-3)$ and $C(2,-2)$ is a right a triangle. Find the area of this triangle.



TOPIC E: EXPONENTIAL AND LOGARITHMIC FUNCTIONS

Do as indicated.

1. Write the equivalent logarithmic expression: $125^{4/3} = 625$ _____

2. Write the equivalent logarithmic expression: $e^{y} = 2x - 3$ _____

3. Write the equivalent exponential expression: $\ln(4) = x + 3$ _____

4. Write the equivalent exponential expression: $\log_3(5x - 4) = 2$ _____

5. Solve the following equations for x.

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

   _____

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

6. Solve the following equations for x.

a. $\log_3(9) = x$

b. $\log_4(x^2 - 3) = 2$

c. $\ln\left(\frac{1+x}{1-x}\right) = 1$

7. Expand the following using properties of logarithms.

$$\ln\left(\frac{x^3y^5}{w^2z^7}\right)$$

8. Express as a single logarithm.

$$8\log_5 x - 3\log_5 y + 7\log_5 z$$

9. Solve the following equations for x.

a. $8\log_2(3x-1) - 7 = 17$

b. $\log_3(x) + \log_3(x-8) = 2$

TOPIC E: POLYNOMIALS AND POLYNOMIAL FUNCTIONS

Do as indicated

1. Factor the following polynomials.

   a. $27x^9y^6 - 64z^3$

   b. $a^6m^2 - 16a^3m^2 + 64m^2$

   c. $4cx^2 - 2dx^2 + 2cy - dy$

   d. $8x^5 - 32x^3y^2 + x^2y^3 - 4y^5$

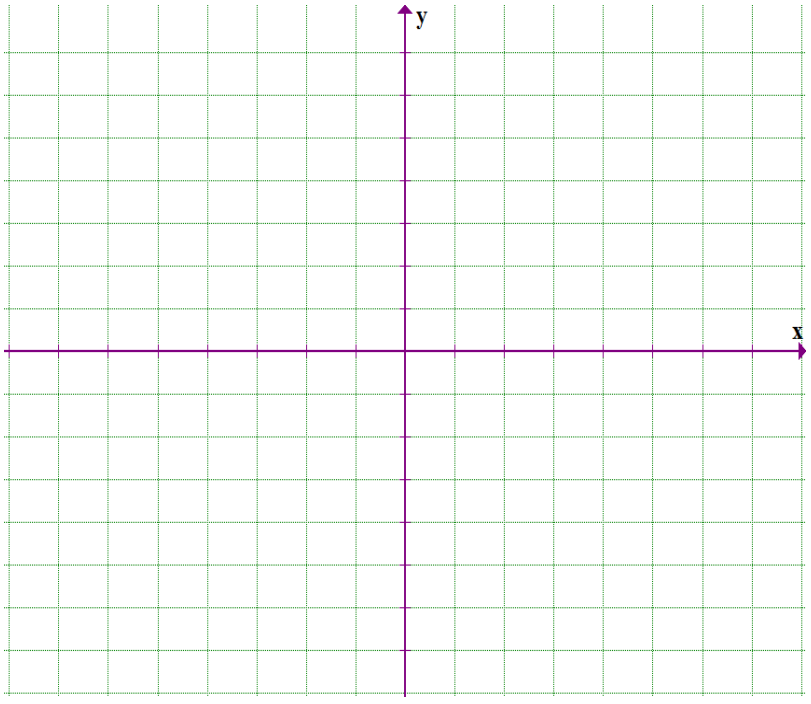
2. Find the remainder when $(2x^{100} - 3x + 4)$ is divided by $(x - 1)$

3. Given the polynomial function: $f(x) = x^2(x + 3)(x - 2)^2$

a) Identify all x-intercepts, their multiplicities and whether if the curve touches or crosses at these x-intercepts.

b) Determine the end behavior of the function as $x \to \infty$ and as $x \to -\infty$.

c) Graph the function.



TOPIC F: RATIONAL EXPRESSIONS AND RATIONAL FUNCTIONS

Do as indicated

1. Simplify the following rational expressions.

a. $\dfrac{x}{(x-1)^2}+\dfrac{2}{x}-\dfrac{x+1}{x^3-x^2}$

b. $\dfrac{9x^2-25}{2x-2}\cdot\dfrac{1-x^2}{6x-10}$

c. $\dfrac{\frac{15}{x^2}-\frac{2}{x}-1}{\frac{4}{x^2}-\frac{5}{x}+4}$

2. Given the rational function below, graph and find the following:

$$f(x) = \frac{x^2 + 7x + 12}{x^2 - 16}$$

a) Identify all intercepts.

b) Find all equations of horizontal and vertical asymptotes.

c) Are there any holes? If yes, identify its location.

d) Graph the function by showing all the information that you derived in parts (a – c).