PRECALCULUS SUMMER WORK

2025-2026

Mrs. Bannon

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This packet is a requirement for those entering the PreCalculus course and is due on the first day of class. Complete as much of this packet on your own as you can, then "google" the topic if you do not remember a topic. Answers to the odd questions have been provided for you to check your work. You will be taking a test on the summer work during your second class.

The *following are guidelines* for *completing* the summer *packet*:

- ✓ You must show all work on the packet to receive credit.
- ✓ Be sure all problems are neatly organized and writing is legible.
- ✔ In the event that you are unsure how to perform functions on your calculator, you may need to look up the necessary syntax or keystrokes. You can certainly find these online. You must be familiar with certain built-in calculator functions such as finding values, intersection points, using tables, and finding zeros of a function.
- ✓ I expect you to come in with certain understandings that are prerequisite to PreCalculus. These topics are covered in this packet.

Finally, I suggest not waiting until the last two weeks of summer to begin on this packet. If you spread it out, you will most likely retain the information much better. Once **again** this **is** due, **completed with quality**, **on the first day of** class. If you have any questions, feel free to contact me at bannonl@gilbertschool.org.

Important

Dates:

Packet Due**: August 27th**, 2025 **(A** Day**) or August** 28th, 20205 (B Day)

Summer Work Test： TBD (Likely the **2nd** class)

(will post to google classroom once the master schedule is finalized)

Google Classroom Code:
tgx5mvk4

***This will count as a quiz grade **for** quarter 1. **It is due** at **the** beginning **of** class **on the** first day **of** school. Late packets will be accepted **up** to **the** following class **for** up to **half** credit.

Summer Review Packet for *Students* Entering Pre-Calculus

Radicals:

To simplify means that 1) no radicand has a perfect square factor and

2) there is no radical in the denominator (rationalize).

Recall the Product Property $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ and the Quotient Property

Examples:

Simplify $\sqrt{24} = \sqrt{4}.\sqrt{6}$ find the perfect square factor

$\frac{a}{b}$

Ja

ج

ار

ما

= 2√6

17 √√7
√2

simplify

Simplify

multiply numerator & denominator by √2

2 √2 √2

√14 √14
√4

multiply straight across and simplify

2

If the denominator contains 2 terms, multiply the numerator and denominator by

conjugate of the denominator (the conjugate of 3+ √2 is 3-√2)

Simplify each of the following.

1.√32

2 .
√√(2x)

3. -64

4 .
√49m2n*

5.

6. √60 •
√105

7. $(\sqrt{5}-\sqrt{6})(\sqrt{5}+\sqrt{2})$

Rationalize.

1

2

8.

9a.

2

10a.

3

$2-\sqrt{5}$

Complex Numbers:

Form of complex number: a + *bi*

Where *a* is the real part and the *biis* the imaginary part

Always make these substitutions $\sqrt{1} = i$ and $i2 = -1$

-1

To simplify: pull out the $\sqrt{1}$ before performing any operation

Example: $\sqrt{-5}=\sqrt{1}.\sqrt{5}$ Pull out

Example:

$i\sqrt{5}$

Pull out $\sqrt{1}$

Example:

$(i\sqrt{5})^2 = i\sqrt{5} \cdot i\sqrt{5}$

Make substitution

$= i^2\sqrt{25} = (-1)(5) = -5$

Treat like any other variable when +, -, , or ÷ (but always simplify $i^2 = -1$)

$2i(3+i) =$
$2(3i)+2i(i)$

$= 6i+2i^2$ Distribute

Simplify

$= 6i+2(-1)$ Substitute

$= -2+6i$ Simplify and rewrite in complex form

Since $i = \sqrt{-1}$,

Simplify

9b. -49

no answer can have an 'i' in the denominator. RATIONALIZE!

10b. $6\sqrt{-12}$

11. $-6(2-8i)+3(5+7i)$

12.
$(3-4)^2$

13. (6-4i)(6+4i)

Rationalize.

14.
1 + 6i

Si

3

Summer Review ***Packet*** for *Students* Entering *Pre-Calculus*

Geometry:

Pythagorean Theorem (right triangles): a2+*b2* = c2

Find **the value of x**.

15

9

x

12

16.

17.

x

5

5

18 A square has perimeter 12 cm **Find** the **length** of **the diagonal**.

12

* In **30° - 60°**-90° **triangles**,
sides **are** in proportion 1√3,2.
***In 45°-45°-90° triangles**, sides are in proportion 1,1,√2

1
60°

√3

Solve for **x and y.**

19.
1

x
45-
y

45

1

30°

45°

20.

45=

√

459

x

4

1

y

21.

x

50P

Equations of Lines:

y

A

305

22

60-

30°

1

Slope-intercept form: $y = mx + h$

Point-slope form: $y - y1 = m(x - x1)$

Vertical line: $x = c$

Horizontal line: $y = c$ *(slope* is *zero)*

(slope is undefined)

Standard Form: $Ax + By = C$

Slope: $m = \frac{Y2 - Y1}{x2 - x;}$

23.

State the slope and y-intercept of the linear equation: $5x - 4y = 8$

24.

Find the x-Intercept and y-Intercept of the equation: $2x - y = 5$

25.

Write the equation in standard form: $y = 7x - 5$

Write the ***equation of*** the line **in slope-**intercept form **with the *following conditions:***

26.

slope -5 and passes through the point (-3, -8)

27.

passes through the points (4,3) and (7,-2)

28. x-intercept = 3 and y-intercept =2

Graphing: Graph each function, inequality, and/or system.

29. 3x-4y=12

30.

[2x+*y*=4 x

- y = 2

31. y <-4x-2

32. *y*+2=x+1

33. y>|*x*|−1

34. y + 4 = (x

− 1)2

Systems of Equations:

3x+*y*=6

2x-2y=4

Substitution:

Solve 1 equation for 1 variable

Rearrange.

Plug into 2nd equation.

Solve for the other variable

Elimination:

Find opposite coefficients for 1 variable

Multiply equation (s) by constant(s).

Add equations together (lose 1 variable)

Solve for variable.

Then plug answer back into an original equation to solve for the 2nd variable.

Solve 1st equation for y

$y=6-3x$

Plug into 2nd equation

$2x-2(6-3x)=4$

Distribute

$2x-12+6x=4$

Add

$8x=16$

Simplify

$x=2$

Plug x=2 back into the original equation

$6+y=6$

Simplify.

Solve each system of equations, using any method.

35.

$$\begin{cases} \sqrt{2}x+y=4 \\ 3x+2y=1 \end{cases}$$

36.

$$\begin{cases} 2x+y=4 \\ 3x-y=14 \end{cases}$$

$6x+2y=12$ Multiply 1st equation by 2

$2x-2y=4$

coefficients of y are opposite

$8x=16$

$x=2$

37. $2w-5z=13$

$6w+3z=10$

Exponents:

Recall the following rules of exponents:

1. $a' = a$

2. $1"1$

3. $a = 1$

4. $a"a" = a$

Any number raised to the power of one equals itself.

One raised to any power is one.

Any nonzero number raised to the power of zero is one.

When multiplying two powers that have the same base, add the exponents.

When dividing two powers with the same base, subtract the exponents.

5. $\frac{a"}{Q"}$

6. $(a")" = a'$

7. $a^{-} = \frac{1}{a}$

When a power is raised to another power, multiply the exponents.

and $a^{-n} = \frac{1}{a^n}$ Any nonzero number raised to a negative power equals its reciprocal raised to the opposite positive power.

Express each **of the following in** simplest form. Answers should not have any negative exponents.

38. $5a$

39. $3c$

40. Zef^{-7}

41. $(n3p-1)2(mp)2$

Simplify.

42. 3m2. 2m

43. $(a3)^{*}$

44. $(-b3ct)s$

45. $4m(3a2m)$

Polynomials:

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To add/subtract polynomials, combine like terms.

EX:

$8x-3y+6-(6y+4x-9)$

$=8x-3y+6-6y-4x+9$

$=8x-4x-3y-6y+6+9$

$=4x-9y+15$

Distribute the negative through the parantheses.

Combine like terms with similar variables.

Simplify.

46. $3x+9+7x2-x3$

47. $7m-6-(2m+5)$

To multiply two binomials, use FOIL.

EX:

(3x-2)(x+4)

= 3x2+12x−2x−8

= 3x2+10x-8

Multiply the first, outer, inner, and last *terms*.

Combine like terms together.

Multiply.

48. (3a+1)(*a*−2)

49. (s+3)(*s*-3)

50. (*c*-5)2

51. (5x+7y) (5x− 7*y*)

Factoring:

Follow these steps in order to factor polynomials.

STEP 1:

Look for a GCF in ALL of the terms.

a) If you have one (other than 1) factor it out.

b) If you don't have one move on to STEP 2

STEP 2: How many terms does the polynomial have?

2 Terms

a) is it the difference of two squares? $a^2 - b^2 = (a+b)(a-b)$

EX: $x^2-25=(x+5)(x-5)$

b) Is it the sum or difference of two cubes?

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

3 Terms

EX:

$m^3 + 64 = (m+4)(m^2 - 4m+16)$

$p^3-125=(p-5)(p^2+5p+25)$

$x^2 + bx + c = (x + _)(x + _)$

$x^2-bx-c = (x-_)(x-_)$

$x^2 + bx - c = (x - _)(x + _)$

$x^2 - bx - c = (x - _)(x + ____)$

4 Terms---Factor by Grouping

a) Pair up first two terms and last two terms.

b) Factor out GCF of each pair of numbers.

EX:

$x^2+7x+12= (x+3)(x+4)$

$x^2 -5x+4 = (x-1)(x-4)$

$x^2+6x-16=(x-2)(x+8)$

$x^2-2x-24=(x-6)(x+4)$

c) Factor out front parentheses that the terms have in common.

d) Put leftover terms in parentheses.

Ex: $x^2+3x+9x+27=$

$= (x^3+3x^2)+(9x+27)$

$= x^2(x+3)+9(x+3)$

$= (x+3)(x^2+9)$

Factor completely.

52. $z^2+4z-12$

53, $6-5x-$

54. $2k^2+2k-60$

55. $-10b-1562$

56. $9c^2+30c+25$

57. $9n^2-4$

58. $27z^3-8$

59. $2mn-2mt+2sn-2st$

To solve quadratic equations**, try to** factor first and **set each** factor equal to zero**. Solve** for your variable**. If the** quadratic does NOT **factor, use** the quadratic formula.

EX:

Set equal *to zero FIRST.*

$x^2-4x=21$

$x^2-4x-21=0$

Now factor.

$(x+3)(x-7)=0$

Set each factor equal to zero.

$x+3=0 \quad x-7=0$

Solve for ***each x.***

$x=-3$

$x=7$

Solve **each** equation.

60. $x^2-4x-12=0$

61. $x^2+25=10x$

62. $x^2-14x+40=0$

Discriminant: The number under the radical in the quadratic formula ($b^2 - 4ac$) can tell you what kind of roots you will have.

If $b^2-4ac>0$ you will have TWO real roots

(touches the x-axis twice)

If $b^2-4ac = 0$ you will have ONE real root (touches axis once)

If $b^2-4ac < 0$ you will have TWO imaginary roots. (Function does not cross the x-axis)

QUADRATIC FORMULA-allows you to solve any quadratic *for* **all** its real and imaginary roots.

$5x^2-2x+4=0$ $x=$

$$\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

EX: In the equation $x^2+2x+3= 0$, find the value of the discriminant, describe the nature of the roots, then solve.

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

Determine the values of a, b, *and* c.

$a=1 b=2 c=3$

Find the discriminant.

$D=2^2-4\cdot1\cdot3$

$D=4-12$

$D=-8$

There *are two imaginary roots.*

Solve: $x = \frac{-2\pm\sqrt{\sqrt{-8}}}{2}$

$x=\frac{-2+21\sqrt{2}}{2}$

$x=-1+i\sqrt{2}$

Find the value of the discriminant, describe the nature of the roots, then solve each quadratic. Use EXACT values.

63. $x^2-9x+14=0$

64. $5x^2-2x+4=0$

Discriminant

Type of Roots:

Discriminant

Type of Roots:

Exact Value of Rools:

Exact Value of Roots:

Long Division-can be used when dividing any polynomials.

Synthetic Division--can ONLY be used when dividing a polynomial by a linear polynomial.

EX: $\frac{2x^2+3x^2-6x+10}{x+3}$

Long Division

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

$x+3$

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

$x+3\overline{)2x^2+3x^2-6x+10}$

(-)
(2x2+6x)

-3x2-6x

(--)(-3x2-9x)

3x+10

(-) (3x+9)

1

Synthetic Division

2x2+3x2-6x+10

x+3

2x3-3x2-6x+10

x+3

-3 2 3 -6

10

-6 9

-9

2 -3

3

1

1

-2x-3x+3+

x+3

Divide each polynomial using long division OR synthetic division.

c-3c2+18c-16

65.

c2+3c-2

x= -2x2 - x + 2

66.

x + 2

To evaluate a function for **the** given value, simply plug the value into the function for **x**.

Evaluate each function ***for*** *the* **given** *value*.

67. f(x) = *x*2-6x+2

f(3) =

68. g (x)=6x-7

g (x + *h*) =

69. f*(x)*=3x2-4

5[*f* (*x*+2)] =

Composition and Inverses of Functions:

Recall: (f_g)(x)= $f(g(x))$ OR $f[g(x)]$ read "**f** of **g** of x" means to plug the inside function in for x in the

outside function.

Example: Given $f(x)=2x2+1$ and $g(x)=x-4$ find $f(g(x))$.

$f(g(x)) = f(x-4)$

$= 2(x-4)2 + 1$

$=2(x2-8x+16)+1$

$=2x2-16x+32+1$

$f(g(x)) = 2x2-16x+33$

Suppose $f(x) = 2x$, $g(x) = 3x-2$, *and* $h(x) = x2-4$. Find **the** following:

70. [g(2)]=_

72.
[h(3)]=

71. [g(x)]=

73.
g[f(x)]=

To find the inverse of a function, simply switch the x and the y and solve for the new "y" value.

Example:

$f(x) = \sqrt{x+1}$

$y = \sqrt{x} + \frac{}{x+1}$

$x = 3y+1$

$(x) =$
$(\sqrt{x}+1)'$

Rewrite *f(x)* as y

Switch ***x*** `and` *y*

Solve for your new y

Cube both sides

$x3 = y+1$

$y =$
$x3 - 1$

$f^{-}(x) = x3-1$

Find the inverse, $f'(x)$, **if** possible.

Simplify

Solve for *y*

Rewrite in inverse notation

74. f(x)=5x+2

Rational Algebraic Expressions:

16

75.

$f(x)$

$1(x)=1$

$2-1$

Summer *Review* Packet **for Students Entering Pre-*Calculus***

Multiplying **and** Dividing: Factor numerator and denominator completely**.** Cancel **any** common factors **in** the top and bottom. If dividing, change divide to multiply and flip the second fraction.

$x2+10x+21$

$x2+2x-15$

EX:

$5-4x-x2$ $x2 + 4x2-21x$

3

(x+7)(x+3)

Factor everything completely.

(x+5)(x-3)

Cancel out common factors in the top *and bottom*.

(5+ x)(1 − x)

x (*x*-3)(x+7)

(x+3)

x(1-x)

Simplify

.

5z2+22-2

m2 - 25

76.

10,5 35

77.

3z

2

78.

m2 + *5m*

21s2 5r3

79.

a2-*5a*+6 3a+12

a+4

a−2

80.

6d−9 6-13d+6d2

5d+1 15d2−7d-2

Addition and Subtraction

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First find the least common denominator. Write each fraction with that LCD. Add/subtract numerators as indicated and leave the denominators as they are.

EX: $\frac{3x+1}{x^2+2x} + \frac{5x-4}{2x+4}$

Factor denominator completely.

$\frac{3x+1}{x(x+2)} + \frac{5x-4}{2(x+2)}$

Find LCD, *which* is $(2x)(x+2)$

$\frac{2(3x+1)}{2x(x+2)} + \frac{x(5x-4)}{2x(x+2)}$

$\frac{6x+2+5x^2-4x}{2x(x+2)}$

$\frac{5x^2+2x+2}{2x(x+2)}$

Rewrite each fraction with the LCD in *the denominator*.

Write as one fraction.

Combine like *terms*.

2x

81.

ι

ท

5

x

3

82.

b

a2b

a

+

a+*b*

ab2

2-a?

83. $\dfrac{3a+4}{a^2+a+3}$

Complex Fractions: Eliminate complex fractions by multiplying the numerator and denominator by the LCD of each of the small fractions. Then simplify the result.

EX: $\dfrac{1+\frac{a}{2}}{2-1}$

84. $\dfrac{a}{2}$

Find LCD:

a2

$\dfrac{1+\frac{a}{2}}{\frac{a}{a^2}}$

$a2 + a$

$2-a2$

$a(a+1)^2$

a

2

Multiply top and bottom by *LCD*.

Factor and simplify if possible.

2+

1

1

2

1

1

4

2−a2

1 6 5+

2

m m

86

2

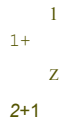
2

m

n

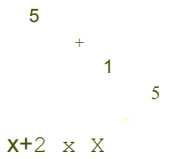
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85

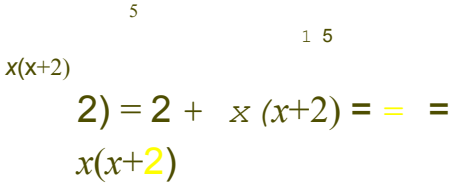




Multiply each term by the LCD of all the fractions. This should eliminate all of our fractions. Then solve the equation as usual.



Find LCD first x(x+2)



Multiply each term by the LCD.

x x

x+2

5x+1(x+2)=5(x+2)

5x+x+2 = 5x+10

6x+2–5x+10

x = 8 ← *Check your* answer! *Sometimes they do not check!*

Simplify and solve.

5

Check:

8+2

n

2

5

+

10

5

1

0

0

8

11

1

1

0

0

5

1

0

0

+

1

1

8

11

5

1

0

0

8

5100

Solve each ***equation***. ***Check your*** solutions.

12

88

+

x

3

/

2

3

1

4

x + 10

4

89.

?

90.

x2 – 2

20

5

x

x – 5 x – 5

Summer ***Review Packet for Pre-***Calculus

Solutions **to** ***Odd*** *Exercises*

1.4√√

2

–9b-li

3. -4

5.

이름

7.5+√10-√30-2√3

2√3

9a.

3

11.3+691--

-13. 52

--15.15-

17. 10 19.
√√2

21. *x*=2*y*=2√3

23. m=

5

4

5

29

b=-2

25. 7x-y=5

27. y=

x +

3

3

89 29

29, 31, 33
graphs

35. (7,-10)

37.

39. *3c2* 41. **no**

36

18

43. ***a***

45. 12a2m2

47.5m-11

49. s2-9

51. 25x2-49y2 **53.** -(x+6)(x-1)

55. -5*b*2
(2b2+3)

57. (3n-2)(*3n*+2)

59. 2(*m*+s)*(n* − t) **61**, x = 5

63. 25; 2 real; 7 *and* 2

65. (c-6)+
38c-28
6+36-2

67.-7

69. 15x2+60x +40

71. 6x-4

73.6x-2

2
5

x
4a+6

75. *f* ' (x)=2x+ · 77.

79. 3(a-3) **81.**

83.

3
171

15
3a(*a*+1)

2x-1

85.

87.

89. x = 4.

7.

x+3

21

2
/
3