

Name _____

Date _____

PreCalculus Summer Work

This packet is meant to provide an opportunity for the incoming PreCalculus students to review concepts from their previous courses including Algebra I and II, Geometry, and Trigonometry.

Entering into PreCalculus means entering into your first year of college preparatory mathematics. Certain concepts that you have been taught over the previous years are assumed to be mastered. If you do not have these skills, you will find that you consistently get problems incorrect next year.

This summer packet is intended for you to brush up and possibly relearn these topics. Rather than give you a textbook to remind you of the formulas and techniques necessary to solve the following problems, we have listed a few websites that have full instructions on the techniques. If and when you are unsure of how to attempt these problems, use these websites. This will be the focus throughout next year as we examine the mathematical relationships between topics numerically, algebraically, and graphically. Success on your assessments throughout next year will greatly depend on whether you can effectively link these skills.

Do not rely on the calculator to work through the majority of these problems. This packet is to be completed by the first day back to school in the fall. You will be tested on this material in the second week of class. You will also be expected to efficiently work through the problems under a time constraint. Many students are not prepared for this expectation and find they do not have the time to check their answers like they are used to, so please prepare accordingly. Wait until at least mid-summer to begin this packet. If you do a few concepts a day, the whole packet will take you about a week to complete. We hope you take this seriously, as we wish for you to be successful throughout PreCalculus next year.

Good Luck!

Sincerely,

Your PreCalculus Teachers

PreCalculus Resources

Videos for particular problems from this packet:

<https://www.youtube.com/playlist?list=PLtggZJv4cYwufBNNq1L8f6lxhAYagf6EY>

In alphabetical order:

Cool Math	coolmath.com
Just Math Tutorials	patrickjmt.com
Khan Academy	khanacademy.org
Math by Fives	mathbyfives.com
Math TV	mathtv.com
Paul's Online Math Notes	tutorial.math.lamar.edu
Purple Math	purplemath.com
Wolfram Alpha	wolframalpha.com
Youtube	youtube.com

A.1–A.7, A.9, Chapter 1, and Chapter 2

Date: _____ Period: _____

Show all work. If you think it, write it. If you use a calculator, indicated that. Write your final answer on the blank on the right-hand side. These will be collected on Friday, September 8th at the end of class.

Find the value of the expression using the given values.

1) $| -3x | - | 4y |$ $x = 4, y = 3$ (Section A.1)

1) _____

Insert $<$, $>$, or $=$ to make the statement true.

2) $\frac{1}{3}$ _____ 0.33 (Section A.1)

2) _____

Determine which value(s), if any, must be excluded from the domain of the variable in the expression.

3) $\frac{x^3 - 9x^2 + 18x}{x^2 - 4x}$ (Section A.1)

3) _____

Solve the problem.

- 4) Find the area A and circumference C of a circle of diameter 23 ft. Use 3.14 for π . Round the result to the nearest tenth. (Section A.2) 4) _____

The lengths of the sides of a triangle are given. Determine if the triangle is a right triangle. If it is, identify the hypotenuse.

- 5) 12, 16, 20 (Section A.2) 5) _____

Perform the indicated operations. Express the answer as a polynomial written in standard form.

- 6) $(2x + 5y)^2$ (section A.3) 6) _____

7) $(9z + 13)(9z - 13)$ (Section A.3)

7) _____

Factor completely. If the polynomial cannot be factored, say it is prime.

8) $x^3 + 1000$ (Section A.3)

8) _____

9) $15x^2 + 19x + 6$ (Section A.3)

9) _____

Perform the indicated operations and simplify the result. Leave the answer in factored form.

10) $\frac{9x^4 - 72x}{3x^2 - 12} \cdot \frac{x^2 + x - 2}{4x^3 + 8x^2 + 16x}$ (Section A.3)

10) _____

11) $\frac{4}{x^2 - 3x + 2} + \frac{6}{x^2 - 1}$ (Section A.3)

11) _____

Find the quotient and the remainder using polynomial long division.

12) $5x^3 - 7x^2 + 7x - 8$ divided by $5x - 2$ (Section A.4) 12) _____

Use synthetic division to find the quotient and remainder.

13) $5x^4 - 13x^2 - 6x + 9$ divided by $x - 3$ (Section A.4) 13) _____

Solve the equation.

14) $\frac{1}{x} + \frac{1}{x-7} = \frac{x-6}{x-7}$ (Section A.5) 14) _____

Find the real solutions of the equation by factoring.

15) $5x^2 + 8x - 4 = 0$ (Section A.5)

15) _____

Solve the equation by the Square Root Method.

16) $(2x - 1)^2 = 25$ (Section A.5)

16) _____

Solve the equation.

17) $|8x + 3| = 7$ (Section A.5)

17) _____

Write the expression in the standard form $a + bi$.

18) $(8 + 9i) - (-6 + i)$ (Section A.6)

18) _____

19) $(9 + 5i)(3 - 8i)$

(Section A.6)

19) _____

20) $\frac{2}{6 + 8i}$

(Section A.6)

20) _____

Solve the equation in the complex number system.

21) $x^2 + 6x + 25 = 0$

(Section A.6)

21) _____

Solve the problem.

22) The manager of a candy shop sells chocolate covered peanuts for \$10 per pound and chocolate covered cashews for \$14 per pound. The manager wishes to mix 90 pounds of the cashews to get a cashew-peanut mixture that will sell for \$11 per pound. How many pounds of peanuts should be used? (Section A.7) 22) _____

23) A college student earned \$7300 during summer vacation working as a waiter in a popular restaurant. The student invested part of the money at 9% and the rest at 7%. If the student received a total of \$585 in interest at the end of the year, how much was invested at 9%? (Section A.7) 23) _____

24) Bob can overhaul a boat's diesel inboard engine in 15 hours. His apprentice takes 30 hours to do the same job. How long would it take them working together assuming no gain or loss in efficiency? (Section A.7) 24) _____

Simplify the expression. Assume that all variables are positive when they appear.

25) $-4\sqrt{48} - 5\sqrt{75}$ (Section A.9)

25) _____

26) $\sqrt[3]{135}$ (Section A.9)

26) _____

Rationalize the denominator of the expression. Assume that all variables are positive when they appear.

27) $\frac{4}{5 - \sqrt{10}}$ (Section A.9)

27) _____

Find the distance $d(P_1, P_2)$ between the points P_1 and P_2 .

28) $P_1 = (2, 4)$; $P_2 = (-1, -7)$ (Section 1.1)

28) _____

Decide whether or not the points are the vertices of a right triangle.

29) $(-6, 5)$, $(-4, 9)$, $(-2, 8)$ (Section 1.1)

29) _____

Solve the problem.

30) If $(-8, 9)$ is the endpoint of a line segment, and $(-9, 13)$ is its midpoint, find the other endpoint. (Section 1.1)

30) _____

Find the midpoint of the line segment joining the points P_1 and P_2 .

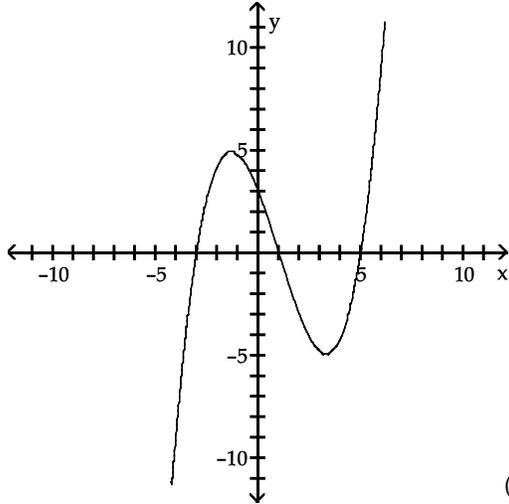
31) $P_1 = (b, 9)$; $P_2 = (0, 1)$ (Section 1.1)

31) _____

List the intercepts of the graph.

32)

32)



(Section 1.2)

List the intercepts for the graph of the equation.

33) $y = \frac{x^2 - 49}{7x^4}$ (Section 1.2)

33) _____

Graph the equation using a graphing utility. Use a graphing utility to approximate the intercepts rounded to two decimal places, if necessary. Use the TABLE feature to help establish the viewing window.

34) $4x^2 - 5y = 68$ (Section 1.2)

34) _____

Solve the problem.

35) If $(a, 3)$ is a point on the graph of $y = 2x - 5$, what is a ? (Section 1.2)

35) _____

Use a graphing utility to approximate the real solutions, if any, of the equation rounded to two decimal places.

36) $x^4 - 5x^3 + 6x - 2 = 0$ (Section 1.3)

36) _____

Solve the equation algebraically. Verify the solution using a graphing utility.

37) $\sqrt{x+1} = 6$ (Section 1.3)

37) _____

38) $\frac{3x+4}{4} + \frac{5x}{6} = -2$ (Section 1.3)

38) _____

39) $7x + 1 - 7(x + 1) = -2x + 3$ (Section 1.3)

39) _____

40) $x^3 + 6x^2 + 25x + 150 = 0$ (Section 1.3)

40) _____

Solve the problem.

41) Find an equation of the line through the point $(-\frac{3}{8}, 8)$ with undefined slope. (Section 1.4) 41) _____

Find an equation for the line with the given properties. Express the answer using the slope–intercept form of the equation of a line.

42) horizontal; containing the point $(2.5, -7.7)$ (Section 1.4) 42) _____

Find an equation for the line with the given properties. Express the answer using the general form of the equation of a line.

43) Parallel to the line $3x + 2y = 5$; containing the point $(6, 0)$ (Section 1.4) 43) _____

Find an equation for the line with the given properties. Express the answer using the slope–intercept form of the equation of a line.

44) Perpendicular to the line $y = -4x - 2$; containing the point $(-3, -4)$ (Section 1.4) 44) _____

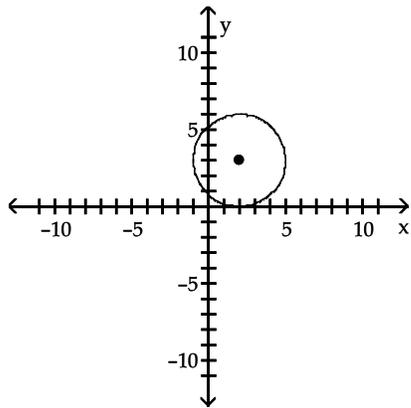
Find an equation for the line with the given properties. Express the answer using the general form of the equation of a line.

45) Perpendicular to the line $-5x + 3y = 4$; containing the point $(0, 1)$ (Section 1.4) 45) _____

46) Containing the points $(-5, -8)$ and $(9, 7)$ (Section 1.4) 46) _____

Write the standard form of the equation of the circle.

47) 47) _____



Find the center (h, k) and radius r of the circle.

48) $x^2 + y^2 + 14x + 12y + 21 = 0$ (Section 1.5) 48) _____

Find the general form of the equation of the circle.

49) With endpoints of a diameter at (6, -2) and (-4, 4) (Section 1.5)

49) _____

Find the domain of the function.

50) $f(x) = \sqrt{3 - x}$ (Section 2.1)

50) _____

51) $g(x) = \frac{x}{x^2 - 1}$ (Section 2.1)

51) _____

Solve the problem.

52) If $f(x) = \frac{x - 3A}{-3x + 3}$ and $f(-3) = -6$, what is the value of A? (Section 2.1)

52) _____

For the given functions f and g , find the requested function and state its domain.

53) $f(x) = 4x - 5$; $g(x) = 2x - 4$ (Section 2.1)

Find $f - g$.

53) _____

Find the value for the function.

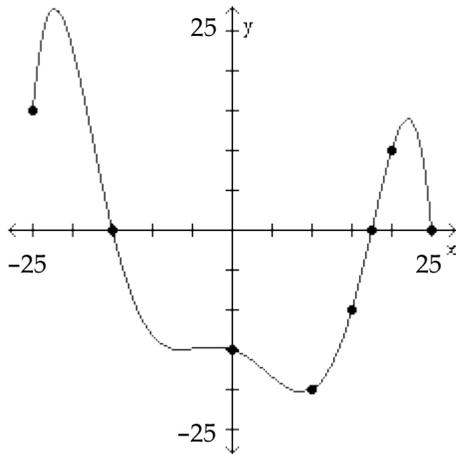
54) Find $f(-x)$ when $f(x) = -3x^2 - 4x - 1$. (Section 2.1)

54) _____

The graph of a function f is given. Use the graph to answer the question.

55) For what numbers x is $f(x) > 0$? (Section 2.2)

55) _____



Use a graphing utility to graph the function over the indicated interval and approximate any local maxima and local minima. If necessary, round answers to two decimal places.

56) $f(x) = x^4 - 5x^3 + 3x^2 + 9x - 3$; $(-5, 5)$ (Section 2.3)

56) _____

Use a graphing utility to find the equation of the line of best fit.

57)

x	1	3	5	7	9
y	143	116	100	98	90

 (Section 2.4)

57) _____

Solve the problem.

58) On planet X, an object falls 18 feet in 3 seconds. Knowing the distance it falls varies directly with the square of the time of fall, how long does it take an object to fall 100 feet? Round your answer to three decimal places. (Section 2.4)

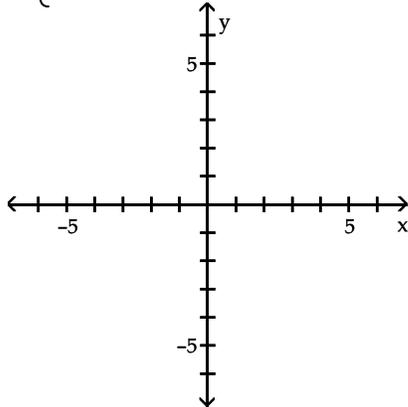
58) _____

Graph the function.

59)

59)

$$f(x) = \begin{cases} x - 4 & \text{if } x < 1 \\ -2 & \text{if } x \geq 1 \end{cases} \quad (\text{Section 2.5})$$



A) Find the domain. _____ Find the range. _____

B) What is $f(-2)$? _____ $f(10)$? _____

Solve the problem.

60) A wire of length $8x$ is bent into the shape of a square. Express the area A of the square as a function of x . (Section 2.7) 60) _____

Answer Key

Testname: 2020 - PRECALC - SUMMER WORK

- 1) 0
- 2) >
- 3) $x = 0, x = 4$
- 4) $A = 415.3 \text{ ft}^2; C = 72.2 \text{ ft}$
- 5) Right triangle; 20
- 6) $4x^2 + 20xy + 25y^2$
- 7) $81z^2 - 169$
- 8) $(x + 10)(x^2 - 10x + 100)$
- 9) $(3x + 2)(5x + 3)$
- 10) $\frac{3(x - 1)}{4}$
- 11) $\frac{10x - 8}{(x - 1)(x + 1)(x - 2)}$
- 12) $x^2 - x + 1$; remainder -6
- 13) $5x^3 + 15x^2 + 32x + 90$; remainder 279
- 14) {1}
- 15) $\{\frac{2}{5}, -2\}$
- 16) {-2, 3}
- 17) $\{\frac{1}{2}, -\frac{5}{4}\}$
- 18) $14 + 8i$
- 19) $67 - 57i$
- 20) $\frac{3}{25} - \frac{4}{25}i$
- 21) $\{-3 - 4i, -3 + 4i\}$
- 22) 270 lb
- 23) \$3700
- 24) 10 hr
- 25) $-41\sqrt{3}$
- 26) $3\sqrt[3]{5}$
- 27) $\frac{20 + 4\sqrt{10}}{15}$
- 28) $\sqrt{130}$
- 29) Yes
- 30) (-10, 17)
- 31) $(\frac{b}{2}, 5)$
- 32) (-3, 0), (1, 0) (5, 0), (0, 3)
- 33) (-7, 0), (7, 0)
- 34) (0, -13.60), (4.12, 0), (-4.12, 0)
- 35) 4
- 36) {4.75, 1, 0.38, -1.13}
- 37) {35}
- 38) $\{-\frac{36}{19}\}$

Answer Key

Testname: 2020 - PRECALC - SUMMER WORK

39) $\{\frac{9}{2}\}$

40) $\{-6\}$

41) $x = -\frac{3}{8}$

42) $y = -7.7$

43) $3x + 2y = 18$

44) $y = \frac{1}{4}x - \frac{13}{4}$

45) $3x + 5y = 5$

46) $15x - 14y = 37$

47) $(x - 2)^2 + (y - 3)^2 = 9$

48) $(h, k) = (-7, -6); r = 8$

49) $x^2 + y^2 - 2x - 2y - 32 = 0$

50) $\{x \mid x \leq 3\}$

51) $\{x \mid x \neq -1, 1\}$

52) $A = 23$

53) $(f - g)(x) = 2x - 1$; all real numbers

54) $-3x^2 + 4x - 1$

55) $[-25, -15), (17.5, 25)$

56) local minimum at $(-0.57, -6.12)$

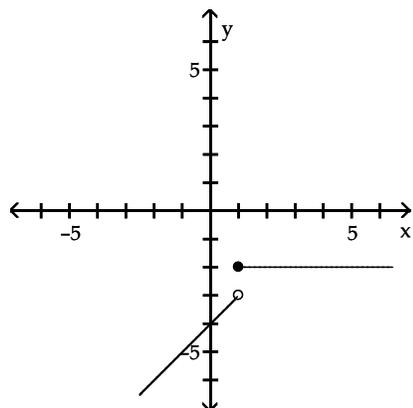
local maximum at $(1.32, 5.64)$

local minimum at $(3, -3)$

57) $y = -6.2x + 140.4$

58) 7.071 sec

59)



60) $A(x) = 4x^2$