Name Answer Key Date

PreCalculus Summer Work (Summer 2019)

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

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

PreCalculus Summer Work (Summer 2019) Name: Answer Key

A.1–A.7, A.9 , Chapter 1, and Chaper 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) 0

$= |-3(4)| - |4(3)|$

$= |-12| - |12|$

$= 12 - 12$

$= 0$

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

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

$\frac{1}{3} = 0.3\overline{333} > 0.33$

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

3) $\frac{x^3 - 9x^2 + 18x}{x^2 - 4x}$ (Section A.1) 3) $x = 0, 4$

$= \frac{x(x^2 - 9x + 18)}{x(x-4)}$

$= \frac{x(x-3)(x-6)}{x(x-4)}$

Any value of x that makes the denominator equal zero must be excluded from the domain.

$x(x-4) = 0$

$x = 0$ or $x - 4 = 0$

$x = 4$

Solve the problem.

radius = 11.5 ft

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) A = 415.3 ft²

C = 72.2 ft

Area = πr^2

$= 3.14(11.5)^2$

$= 3.14(132.25)$

$= 415.265$

$\approx 415.3 \text{ ft}^2$

Circumference = $2\pi r$

$= \pi d$

$= 3.14(23)$

$= 72.22$

≈ 72.2 ft

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) Yes, 20 units

$c^2 \_\_ a^2 + b^2$

$20^2 \_\_ 12^2 + 16^2$

$400 \_\_ 144 + 256$

$400 = 400$

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

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

6) _____

$4x^2 + 20xy + 25y^2$

$= (2x + 5y)(2x + 5y)$

$= 4x^2 + 10xy + 10xy + 25y^2$

$= 4x^2 + 20xy + 25y^2$

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

7) $81z^2 - 169$

$= (9z + 13)(9z - 13)$

$= 81z^2 - 117z + 117z - 169$

$= 81z^2 - 169$

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

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

8) _____

$= (x)^3 + (10)^3$ Sum of Cubes

$= (x + 10)(x^2 - 10x + 100)$

$(x+10)(x^2-10x+100)$

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

9) $(3x+2)(5x+3)$

$15 \cdot 6 = 90$

$10 \quad 9$

$= 15x^2 + 10x + 9x + 6$

$= 5x(3x + 2) + 3(3x + 2)$

$= (3x + 2)(5x + 3)$

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

$= \frac{9x(x^3 - 8)}{3(x^2 - 4)} \cdot \frac{(x+2)(x-1)}{4x(x^2 + 2x + 4)}$

$= \frac{9x(x-2)(x^2+2x+4)}{3(x+2)(x-2)} \cdot \frac{(x+2)(x-1)}{4x(x^2+2x+4)}$

$= \frac{3(x-1)}{4}$

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

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

$= \frac{4}{(x-2)(x-1)} + \frac{6}{(x+1)(x-1)}$

$= \frac{4}{(x-2)(x-1)} \cdot \frac{(x+1)}{(x+1)} + \frac{6}{(x+1)(x-1)} \cdot \frac{(x-2)}{(x-2)}$

$= \frac{4(x+1) + 6(x-2)}{(x-2)(x-1)(x+1)}$

$= \frac{4x + 4 + 6x - 12}{(x-2)(x-1)(x+1)}$

$= \frac{10x - 8}{(x-2)(x-1)(x+1)}$

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

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) _____

$x^2 - x + 1$ R: -6

$$
\begin{array}{r}
x^2 - x + 1 \quad R: -6 \\
5x-2 \overline{)\,5x^3 - 7x^2 + 7x - 8} \\
-(5x^3 - 2x^2) \\
\hline
-5x^2 + 7x \\
-(-5x^2 + 2x) \\
\hline
5x - 8 \\
-(5x - 2) \\
\hline
-6
\end{array}
$$

Use synthetic division to find the quotient and remainder.

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

13) _____

$5x^3 + 15x^2 + 32x + 90$

R: 279

$x - 3 = 0$, $x = 3$

	x^4	x^3	x^2	x	c
	5	0	−13	−6	9
↓		15	45	96	270
	5	15	32	90	279
	x^3	x^2	x	c	R

Solve the equation.

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

14) $x = 1$

$$x(x-7)\left(\frac{1}{x} + \frac{1}{x-7}\right) = \left(\frac{x-6}{x-7}\right)x(x-7)$$

$$(x-7) + x = (x-6)x$$

$$2x - 7 = x^2 - 6x$$

$$0 = x^2 - 8x + 7$$

$$0 = (x-7)(x-1)$$

$x - 7 = 0$ $\quad x - 1 = 0$

$x = 7$ $\quad x = 1$

Causes denominator to = 0.

Find the real solutions of the equation by factoring.

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

15) $x = -2$ or $\frac{2}{5}$

$5x^2 + 10x - 2x - 4 = 0$ $\quad 5 \cdot -4 = -20$, $10 \; -2$

$5x(x+2) - 2(x+2) = 0$

$(x+2)(5x-2) = 0$

$x+2=0$ or $5x-2=0$

$x = -2$ $\quad 5x = 2$, $x = \frac{2}{5}$

Solve the equation by the Square Root Method.

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

16) $x = -2$ or 3

$2x - 1 = \pm\sqrt{25}$

$2x - 1 = \pm 5$

$2x - 1 = -5$ or $2x - 1 = 5$

$2x = -4$ $\quad 2x = 6$

$x = -2$ or $x = 3$

Solve the equation.

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

17) $x = -\frac{5}{4}$ or $\frac{1}{2}$

$8x + 3 = -7$ or $8x + 3 = 7$

$8x = -10$ $\quad 8x = 4$

$x = \frac{-10}{8}$ $\quad x = \frac{4}{8}$

$x = -\frac{5}{4}$ $\quad x = \frac{1}{2}$

Write the expression in the standard form a + bi.

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

18) $14 + 8i$

$= 8 + 9i + 6 - i$

$= 8 + 6 + 9i - i$

$= 14 + 8i$

FOIL

19) $(9 + 5i)(3 - 8i)$ (Section A.6)

19) $67 - 57i$

$= 27 - 72i + 15i - 40i^2$

$= 27 - 57i - 40(-1)$

$= 27 - 57i + 40$

$= 67 - 57i$

20) $\frac{2}{6 + 8i}$ (Section A.6) Complex conjugate

20) $\frac{3}{25} - \frac{4}{25}i$

$= \frac{2}{6+8i} \cdot \frac{6-8i}{6-8i}$

$= \frac{2(6-8i)}{36 - 48i + 48i - 64i^2}$

$= \frac{12 - 16i}{36 - 64(-1)}$

$= \frac{4(3-4i)}{36+64}$

$= \frac{4(3-4i)}{100}$

$= \frac{3-4i}{25}$

Solve the equation in the complex number system.

21) $x^2 + 6x + 25 = 0$ (Section A.6)

21) $-3 \pm 4i$

Completing the Square

$x^2 + 6x = -25$

$x^2 + 6x + \underline{9} = -25 + \underline{9}$

$(x + 3)^2 = -16$

$x + 3 = \pm\sqrt{-16}$

$x + 3 = \pm 4i$

$x = -3 \pm 4i$

$x = -3 - 4i$ or $x = -3 + 4i$

Quadratic Formula

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

$= \frac{-6 \pm \sqrt{(6)^2 - 4(1)(25)}}{2(1)}$

$= \frac{-6 \pm \sqrt{36 - 100}}{2}$

$= \frac{-6 \pm \sqrt{-64}}{2}$

$= \frac{-6 \pm 8i}{2}$

$= -3 \pm 4i$

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) 270 lbs

	$/lb	lbs	Total Cost
Peanuts	10	x	10x
Cashews	14	90	1260
Mix	11	90+x	11(90+x)

$10x + 1260 = 11(90 + x)$

$10x + 1260 = 990 + 11x$

$270 = x$

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) $3700

Let x = amount invested at 9%

y = " " " 7%

$x + y = 7300$

$(0.09)x + (0.07)y = 585$

$y = 7300 - x$

$0.09x + 0.07(7300 - x) = 585$

$0.09x + 511 - 0.07x = 585$

$0.02x = 74$

$x = 3700$

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) 10 hours

Bob = 15 hours to complete job alone

Apprentice = 30 hours to complete job alone

Let x = # of hours to complete the job working together

In 1 hr: $\frac{1}{15} + \frac{1}{30} = \frac{1}{x}$

Bob Apprentice Total

$30x\left(\frac{1}{15} + \frac{1}{30}\right) = \left(\frac{1}{x}\right)30x$

$2x + x = 30$

$3x = 30$

$x = 10$

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

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

25) $-41\sqrt{3}$

$= -4\sqrt{16}\sqrt{3} - 5\sqrt{25}\sqrt{3}$

$= -4(4)\sqrt{3} - 5(5)\sqrt{3}$

$= -16\sqrt{3} - 25\sqrt{3}$

$= -41\sqrt{3}$

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

26) $3\sqrt[3]{5}$

$= \sqrt[3]{3^3 \cdot 5}$

$= 3\sqrt[3]{5}$

$135 = 3^3 \cdot 5$

5 27

3 9

3 3

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

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

27) $\dfrac{20+4\sqrt{10}}{15}$

$= \dfrac{4}{5-\sqrt{10}} \cdot \dfrac{5+\sqrt{10}}{5+\sqrt{10}}$

$= \dfrac{4(5+\sqrt{10})}{25+5\sqrt{10}-5\sqrt{10}-10}$

$= \dfrac{20+4\sqrt{10}}{15}$

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) $\sqrt{130}$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \rightarrow = \sqrt{130}$$
$$= \sqrt{(-1-2)^2 + (-7-4)^2}$$
$$= \sqrt{(-3)^2 + (-11)^2}$$
$$= \sqrt{9 + 121}$$

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

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

29) Yes

Slopes

$$m_{AB} = \frac{9-5}{-4-(-6)} = \frac{4}{2} = 2$$
$$m_{BC} = \frac{8-9}{-2-(-4)} = \frac{-1}{2}$$

opposite reciprocals so the sides are perpendicular

$$m_{CA} = \frac{5-8}{-6-(-2)} = \frac{-3}{-4} = \frac{3}{4}$$

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) $(-10, 17)$

$$m = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$
$$(-9, 13) = \left(\frac{-8 + x_2}{2}, \frac{9 + y_2}{2}\right)$$

$$-9 = \frac{-8 + x_2}{2} \qquad 13 = \frac{9 + y_2}{2}$$
$$-18 = -8 + x_2 \qquad 26 = 9 + y_2$$
$$-10 = x_2 \qquad 17 = y_2$$

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

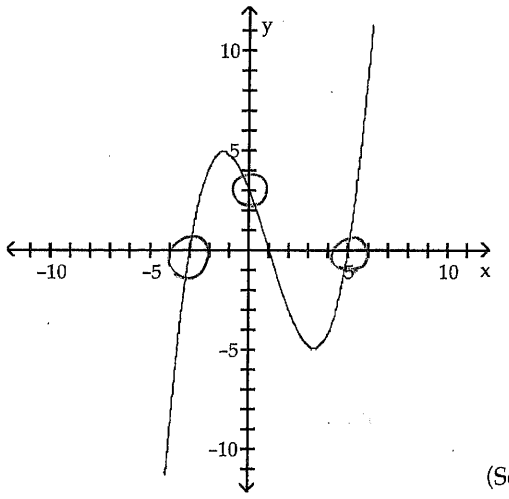
31) $P_1 = (b, 9)$; $P_2 = (0, 1)$ (Section 1.1)

31) $\left(\frac{b}{2}, 5\right)$

$$m = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$
$$= \left(\frac{b+0}{2}, \frac{9+1}{2}\right)$$
$$= \left(\frac{b}{2}, \frac{10}{2}\right)$$
$$= \left(\frac{b}{2}, 5\right)$$

List the intercepts of the graph.

32)



(Section 1.2)

32)

x-intercepts:
(-3,0), (5,0)

y-intercept:
(0,3)

List the intercepts for the graph of the equation.

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

33) x-intercepts:
(-7,0), (7,0)
y-intercept:
None

y-intercept:
Set $x = 0$
$y = \frac{0^2 - 49}{7(0)^2}$
Whoops! Can't divide by 0.

x-intercept(s):
set $y = 0$
$0 = \frac{x^2 - 49}{7x^4}$
$0 = x^2 - 49$
$0 = (x+7)(x-7)$
$x + 7 = 0$ $x - 7 = 0$
$x = -7$ $x = 7$

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) (-4.12,0), (4.12,0)
(0, -13.60)

$-5y = -4x^2 + 68$
$y = \frac{-4x^2}{-5} + \frac{68}{-5}$
$y = \frac{4}{5}x^2 - 13.6$
$y = 0.8x^2 - 13.6$

Solve the problem.

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

35) a = 4

$y = 2x - 5$
$y = 3$ when $x = a$
$3 = 2(a) - 5$
$3 = 2a - 5$
$8 = 2a$
$a = 4$

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) $X = -1.13,$ $0.37,$ $1,$ 4.75

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

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

37) $X = 35$

$(\sqrt{x+1})^2 = 6^2$

$x + 1 = 36$

$x = 35$

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

38) $X = -\frac{36}{19}$

LCD is 12

$12\left(\frac{3x+4}{4} + \frac{5x}{6}\right) = (-2)12$

$3(3x+4) + 2(5x) = -24$

$9x + 12 + 10x = -24$

$19x = -36$

$x = \frac{-36}{19}$

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

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

$7x + 1 - 7x - 7 = -2x + 3$

$-6 = -2x + 3$

$-9 = -2x$

$x = \frac{-9}{-2}$

$x = \frac{9}{2}$

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

40) $X = -6$

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

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

$x + 6 = 0$ $\quad x^2 + 25 = 0$

$x = -6$ $\quad x^2 = -25$

no real solution

Solve the problem.

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

undefined slope means this is a vertical line.

So it has the equation $x = a$.

Thus $x = -\frac{3}{8}$

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) $y = -7.7$

$m = 0$

$y = mx + b$

$-7.7 = (0)(2.5) + b$

$-7.7 = b$

$y = -7.7$

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) $3x + 2y - 18 = 0$

$2y = -3x + 5$

$y = -\frac{3}{2}x + \frac{5}{2}$

$m = -\frac{3}{2}$, $m_{\parallel} = -\frac{3}{2}$

$y - y_1 = m(x - x_1)$

$y - 0 = -\frac{3}{2}(x - 6)$

$y = -\frac{3}{2}x + 9$

$2y = -3x + 18$

$3x + 2y = 18$

$3x + 2y - 18 = 0$

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

$m = -4$

$m_{\perp} = \frac{1}{4}$

$y - y_1 = m(x - x_1)$

$y - (-4) = \frac{1}{4}(x - (-3))$

$y + 4 = \frac{1}{4}(x + 3)$

$y + 4 = \frac{1}{4}x + \frac{3}{4}$

$y = \frac{1}{4}x + \frac{3}{4} - \frac{16}{4}$

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

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) $3x + 5y - 5 = 0$

$3y = 5x + 4$

$y = \frac{5}{3}x + \frac{4}{3}$

$m = \frac{5}{3}, m_1 = -\frac{3}{5}$

$y - y_1 = m(x - x_1)$

$y - 1 = -\frac{3}{5}(x - 0)$

$y - 1 = -\frac{3}{5}x$

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

$5y = -3x + 5$

$3x + 5y = 5$

$3x + 5y - 5 = 0$

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

46) $15x - 14y = 37$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{7 - (-8)}{9 - (-5)}$

$m = \frac{7+8}{9+5}$

$= \frac{15}{14}$

$y - y_1 = m(x - x_1)$

$y - 7 = \frac{15}{14}(x - 9)$

$y - 7 = \frac{15}{14}x - \frac{135}{14}$

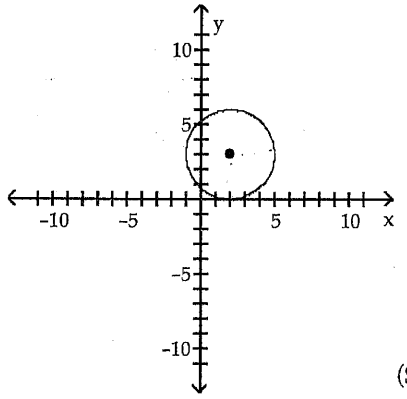
$14y - 98 = 15x - 135$

$-15x + 14y = -37$

$15x - 14y = 37$

Write the standard form of the equation of the circle.

47)



(Section 1.5)

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

Center: $(2, 3)$ h, k

Radius = 3

$(x-h)^2 + (y-k)^2 = r^2$

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

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

48) Center: $(-7, -6)$

Radius = 8

$x^2 + 14x + y^2 + 12y = -21$

$x^2 + 14x + 49 + y^2 + 12y + 36 = -21 + 49 + 36$

$(x+7)^2 + (y+6)^2 = 64$

Find the general form of the equation of the the circle.

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

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

49) _____

Center = midpoint = $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{6+(-4)}{2}, \frac{-2+4}{2}\right) = \left(\frac{2}{2}, \frac{2}{2}\right) = (1,1)$

Radius = distance from center to an endpoint of the diameter

$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$= \sqrt{(6-1)^2+(-2-1)^2}$

$= \sqrt{5^2+(-3)^2}$

$= \sqrt{25+9}$

$= \sqrt{34}$

$(x-1)^2+(y-1)^2 = \sqrt{34}^2$

$x^2-2x+1+y^2-2y+1=34$

$x^2+y^2-2x-2y+2=34$

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

Find the domain of the function.

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

50) _____

$3-x \geq 0$

$-x \geq -3$

$x \leq 3$

$x \leq 3$

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

51) $x \neq -1$ and 1

$x^2-1 \neq 0$

$(x+1)(x-1) \neq 0$

$x+1 \neq 0$ and $x-1 \neq 0$

$x \neq -1$ and $x \neq 1$

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) $A = 23$

$f(-3) = -6 = \frac{(-3)-3A}{-3(-3)+3}$

$-6 = \frac{-3-3A}{9+3}$

$-6 = \frac{-3-3A}{12}$

$-72 = -3-3A$

$-69 = -3A$

$A = 23$

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) $2x - 1$

Domain: $\mathbb{R}$

$$f - g = f(x) - g(x)$$
$$= (4x - 5) - (2x - 4)$$
$$= 4x - 5 - 2x + 4$$
$$= 2x - 1$$

Find the value for the function.

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

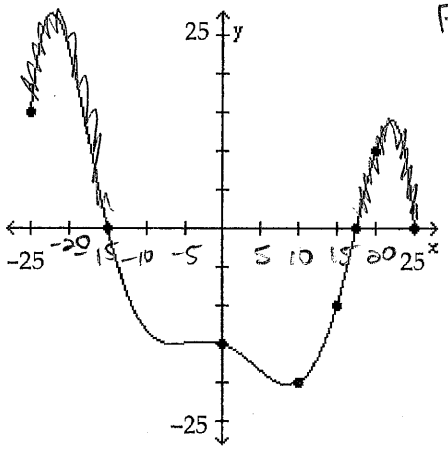
54) $-3x^2 + 4x - 1$

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

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) $[-25, -15) \cup (17.5, 25)$



For what numbers x is $y > 0$

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)

Local maxima: $(1.32, 5.64)$

Local minima: $(-0.57, -6.12)$
$(3, -3)$

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)

Plug the x-values into L_1 in STAT

" " y-values " L_2 " "

Then go to STAT → CALC → LinReg $(ax + b)$

57) $a = -6.2$

$b = 140.4$

$y = -6.2x + 140.4$

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) 7.071 seconds

Direct Variation

$y = kx$

Let d = distance

t = time

$d = kt^2$

18 feet = distance

3 seconds = time

$18 = k(3)^2$

$18 = 9k$

$k = 2$

$d = 2t^2$

$d = 2t^2$

100 ft = distance

$100 = 2t^2$

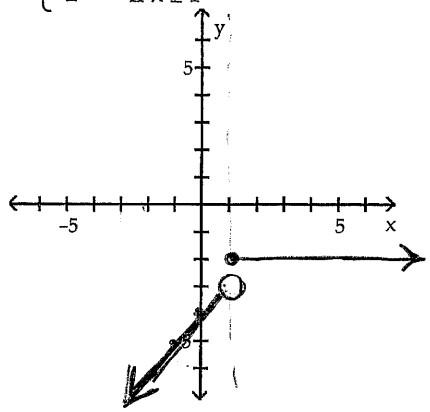
$50 = t^2$

$t = \sqrt{50}$

$t \approx 7.071$

Graph the function.

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



59)

A) Find the domain. $\mathbb{R}$ Find the range. $(-\infty, -3) \cup [-2, -2]$

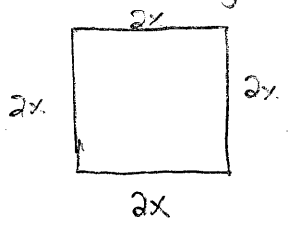
B) What is f(−2)? -6 f(10)? -2

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

8x length of wire



$P = 4s$ $A = s^2$

$8x = 4s$ $A = (2x)^2$

$s = 2x$ $A = 4x^2$

1) 0
2) >
3) $x = 0, x = 4$
4) $A = 415.3\ ft^2$; $C = 72.2$ 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) $\left\{\frac{1}{2}, -\frac{5}{4}\right\}$
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) $\{-\frac{36}{19}\}$

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

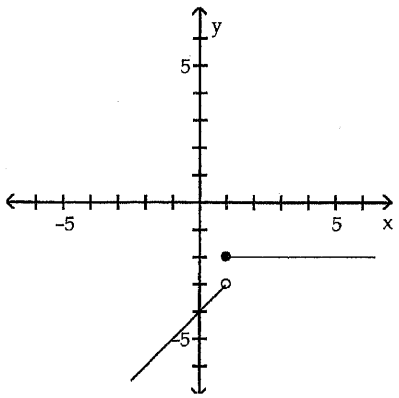
55) $[-25, -15), (17.5, 25)$

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