**Summer Assignment for All Gunderson Pre-Calculus Students**

This summer assignment is given to help you have a successful year in Math Analysis. Your summer assignment is to complete each problem following the directions below. You will be asked for your completed assignment on the first day of school.

- Work the problems on 8 ½" x 11" lined or grid binder paper.

- Head each of your pages as shown here:

| | |
|---|---|
| MA Summer Assignment | Print first name, last name |
| Print date | Period # of your math class |

- Label the beginning of each problem with its number; work the problems in order

- Circle the number of each problem.

- Put a box around each of your answers where possible.

- You may use the back of the page if you wish.

- Show your work/steps on every problem that is not a fill-in-the-blank problem.

- You will be asked for your completed assignment on Friday of the first week of school.

- Late work must be made up for credit.

- If you still do not understand how to work a problem, copy the problem onto your paper and leave space to work the problem when your teacher explains the problem in class.

- Do not skip problems. You should have something written for every problem assigned. Your teacher will help you with the problems that trouble you.

- After several days, you should expect a quiz covering all the topics on the summer assignment.

## Pre-Calculus Summer Assignment
## PLEASE FOLLOW DIRECTIONS GIVEN FOR SUMMER ASSIGNMENTS

**Problem 1:**

a. In what quadrant does the point $(-2, 5)$ lie?

b. Is $(4, -1)$ a point on the graph of the equation $2x - 5y = 7$? Why or why not?

c. Simplify each expression completely: $3\sqrt{63}$ and $\sqrt{10}\left(\sqrt{2}+2\right)$

d. The lengths of the legs of a right triangle are 3 cm and 6 cm. Find the length of the hypotenuse.

e. Let $3x + 4y = -9$. Find y when $x = -2$.

f. Solve each of these equations for y: $5x - 8y = 16$ and $\frac{y-4}{x+3} = \frac{3}{4}$

g. Multiply each of these expressions: $(2x - 5)^2$ and $(\sqrt{3} + 2)(\sqrt{3} - 2)$

h. Factor each of these expressions: $x^2 - 5x + 6$ and $x^2 - 25$

i. Let $y = x^2 + 2x - 3$. Find x when $y = 0$.

j. Solve for x by taking the square root of both sides: $(x - 2)^2 = 9$

**Problem 2:**

a. Classify each function as linear or quadratic.

$f(x) = 5$ $g(x) = 7x - 3x^2$ $h(x) = 2x - 15$

b. If $f(x) = 3x^2 - x - 1$, find $f(0)$, $f(-2)$, and $f(i)$.

c. Is $x = -1$ a zero of the function $P(x) = x^3 - 3x^2 - x + 3$? Why or why not?

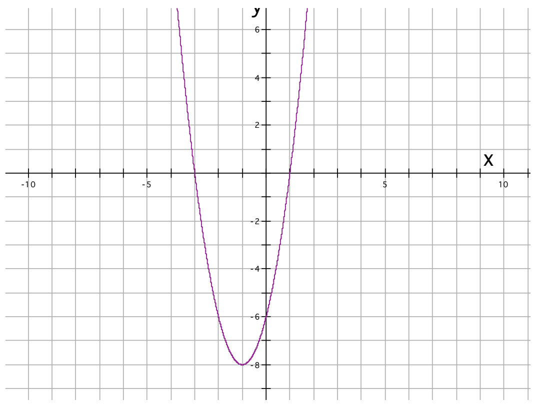
d. Find all real and imaginary roots of each of these equations:

$x^2 - 2x + 6 = 0$ $6x - 4x^2 = 0$ $(x - 1)(x^2 + 8) = 0$

e. Factor completely: $5x^3 - 20x$

**Problem 2, continued:**

f. Find an equation of this parabola: *(Scale: 1 square = 1 unit.)*




g. Sketch the graph of $f(x) = -x^2 + 6x - 9$. Label the vertex, the axis of symmetry, and the x- and y-intercepts. What is the maximum value of f?

h. The sides of a rectangle are $x$ and $3 - 2x$. Express the rectangle's area as a function of $x$. Express the rectangle's perimeter as a function of $x$. Explain why $x$ cannot equal 2.

i. The height and the diameter of a cylinder are equal. Express the volume of the cylinder as a function of its radius.

j. Find the sum and the product of $1 - 3i$ and $1 + 3i$.

**Problem 3:**

a. Graph the inequality $-3 \leq x < 2$ on a number line.

b. Solve the inequality $5 - 4x \leq -7$ for x.

c. Give the values of x that make each statement true: $|x| = 5$; $|x| < 5$; $|x| > 5$

d. Graph $P(x) = x(x - 3)(x + 1)$. Then tell if the graph of $y = P(x)$ is above or below the x-axis for each of the given set of x-values: $x < -1$; $-1 < x < 0$; $0 < x < 3$; $x > 3$

e. Sketch the graphs of $y = x^2 - 4x + 3$ and $x - 2y = -6$ on the same set of axes. Find the coordinates of each intersection point.

**Problem 3, continued:**

f. Let P = 10 x + 8y. In parts i – v, evaluate P for the ordered pair (x, y). Which ordered pair in parts i – v gives the largest value for P?

i. (0, 0)  ii. (0, 5)  iii. (3, 3)  iv. (5, 2)  v. (6, 0)

g. Factor: $a^3 - 2a^2 - a + 2 = 0$

h. Solve for x: $4x^4 - 21x^2 + 27 = 0$

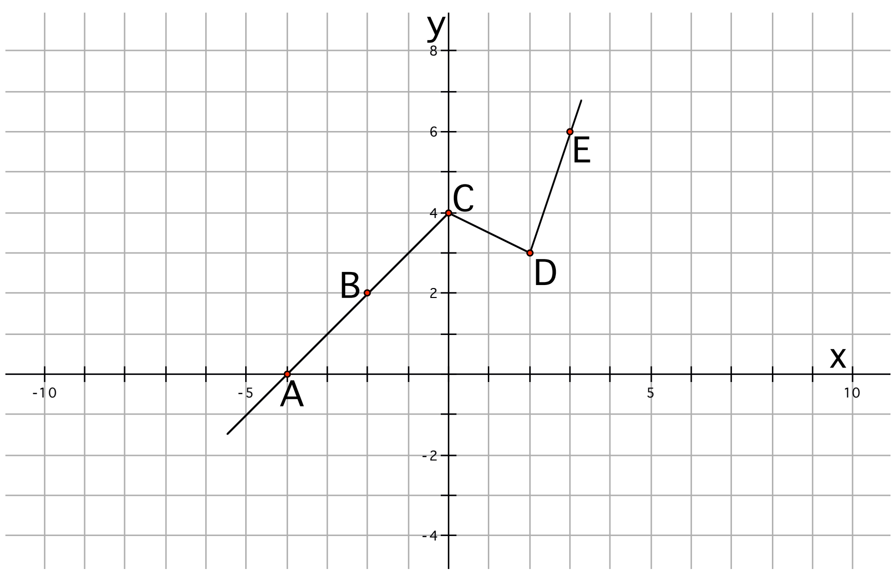
**Problem 4:**

a. For what value of x is the function $g(x) = \dfrac{2x+1}{x+7}$ undefined?

b. Write an inequality that describes the set of y-values on the graph of the function $f(x) = (x - 2)^2 - 1$.

c. Let k(x) = 3x + 2. Find k(a), k(2a), and k(a + 1).

**In exercises d, e, and f, refer to the graph of y = f(x) shown below. Draw the graph obtained by changing the graph of f in the way specified.** *(Scale: 1 square = 1 unit.)*




d. Shift each point of the graph of f to the right 3 units. For example, instead of plotting the point (2, 3), plot the point (5, 3).

e. Divide the y-coordinate of each point of the graph of f by 2. For example, instead of plotting the point (2, 3), plot the point (2, 1.5).

**Problem 4, continued:**

f. Reverse the x- and y-coordinates of each point of the graph of f. For example, instead of plotting the point (2, 3), plot the point (3, 2).

g. Solve $x = y^3 - 4$ for y in terms of x.

h. Find the vertex and the axis of symmetry for the parabola $y = 2x^2 + 8x + 5$.

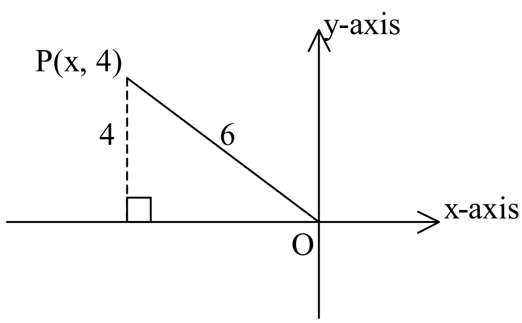
i. Give the dimensions of three different rectangles with area 6 $cm^2$.

j. Each leg of an isosceles triangle is twice as long as its base. Express the perimeter of the triangle in terms of the length b of the base.

**Problem 5**

a. Sketch the graph of the circle $x^2 + (y - 2)^2 = 25$. Find the circumference and the area of the circle.

b. In the diagram, point P(x, 4) is located 6 units from the origin. Find the value of x.




c. Find the height of an equilateral triangle with sides of length 10.

d. The legs of a right isosceles triangle are 5 cm long. Find the length of the triangle's hypotenuse.

**Problem 6**

a. Convert each degree measure to radians. Leave answers in terms of π.

180°  90°  315°  60°  120°  240°  30°  1°

b. Convert each radian measure to degrees.

$2\pi$  $\pi$  $\frac{\pi}{2}$  $\frac{\pi}{4}$  $\frac{3\pi}{4}$  $\frac{5\pi}{3}$  $\frac{11\pi}{6}$  $\frac{5\pi}{6}$

**Problem 6, continued:**

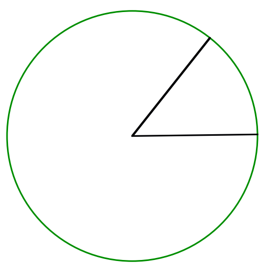
c. Find two angles, one positive and one negative, that are coterminal with each given angle.

$10°$ $\quad 100°$ $\quad -5°$ $\quad 400°$ $\quad \pi$ $\quad \frac{\pi}{2}$ $\quad -\frac{\pi}{3}$ $\quad 4\pi$

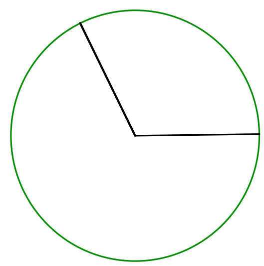
d. The equation $\theta = (60 + 360n)°$, where $n$ is an integer, represents all angles $\theta$ coterminal with an angle of _?_°. What would be the equivalent equation in radians?

e. Give the radian measure of the smaller central angle in each of the following diagrams.

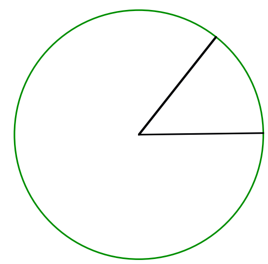
r = 2, arc length s = 2



r = 2, arc length s = 4



r = 2, arc length s = 1.5



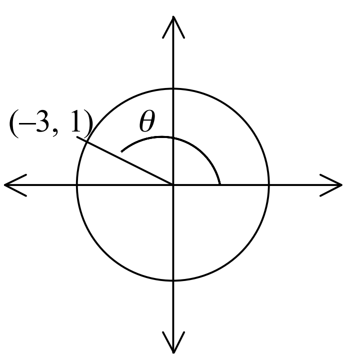
f. Find the degree measure of an angle formed by each rotation described.

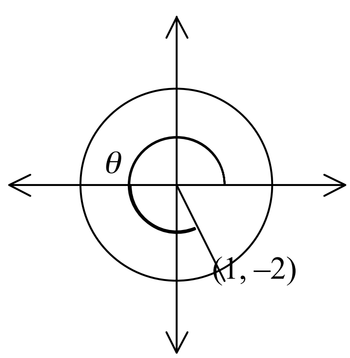
$1\frac{2}{3}$ revolutions counterclockwise

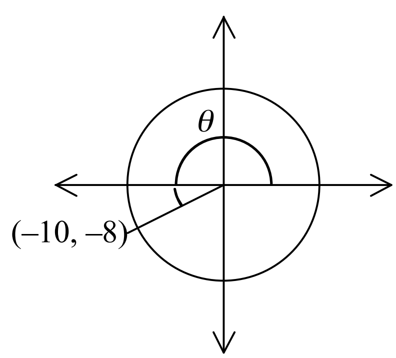
$2\frac{3}{4}$ revolutions clockwise

**Problem 7**

a. Find $\sin\theta$ and $\cos\theta$ in each of the three drawings below.



**Problem 7, continued:**

b. State whether each expression is positive or negative.

| | | | | | |
|---|---|---|---|---|---|
| sin 165° | sin 265° | cos 210° | cos 310° | $\sin\frac{5\pi}{6}$ | $\cos\frac{5\pi}{6}$ |
| $\sin\frac{4\pi}{3}$ | $\cos\frac{5\pi}{3}$ | sin 2 | cos 2 | sin 4 | cos 4 |

c. Does cos $\theta$ increase or decrease as:

$\theta$ increases from 0° to 90°?

$\theta$ increases from 90° to 180°?

$\theta$ increases from 180° to 270°?

$\theta$ increases from 270° to 360°?

d. Repeat exercise c above for $\sin\theta$.

e. Use the unit circle to justify the fact that for all $\theta$, $(\cos\theta)^2 + (\sin\theta)^2 = 1$.

f. There are infinitely many values of $\theta$ for which cos $\theta = 0$. Name several.

g. Explain the meaning of $\theta = 45° + \text{n} \lozenge 360°$, where n in an integer. What is the equivalent statement if $\theta$ is expressed in radians?