**Summer Assignment**

**AP Calculus AB/BC**

**Directions**: Complete each problem on a separate page. Show all work. Each problem should be completed ***without your calculator***. Be ready to hand in your work the first day of school.

**Lines and Their Graphs**

**1. Write the equation of the following lines in point-slope form.**

a. The line through the points (2, 4) and (4, -5).

b. The line with slope 3 passing through the point (4, -2).

c. The line perpendicular to 2x – 4y = 8 passing through the point (1, -2).

d. The line that contains the points (1, –5) and (–2, 4).

**2. Find the equation of the straight line that passes through the point (2, 4) and is parallel to the line**

**3. Find the equation of the line that is perpendicular to the line 2x + 3y – 8 = 0 at the point (1,2)**

**4. The line with the slope 5 that passes through the point (-1,3) intersects the x axis at a point. What are the coordinates of this point?**

**5. What are the coordinates of the point at which the line passing through the points (1, -3) and (-2,4) intersects the y axis?**

**6. Let f be a linear function such that f(2) = 5 and f(6) = –1. Find an equation for f(x).**

**Algebraic Manipulation**

**1. Simplify the following expressions.**

a. b. c.

d. e. f.

g. h. i.

j. k. l.

m.

**2. Solve the following for all real values of x.**

a. b. c.

d. e. f.

g. h. j.

k. l. 2x2 + 2x + 1 = 0. m. (x – 2)(x + 2)(x – 1)2 = 0

n.

**3. Factor as indicated.**

a.

b.

c.

d.

**4. Factor completely.**

a. b. c.

d. e. f.

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

**6. Solve x = y3 – 4 for y in terms of x.**

**7. Solve the system:**

**8. Given find f(1) – f(5).**

**9. Given find f(x+2) – f(2).**

**10. Give find**

**11. Given f(x) = x – 3 and complete the following.**

a. f(g(x)) = b. g(f(x)) = c. f(f(x)) =

**12. Given and g(x) = x2 – 5 complete the following.**

a. f(g(7)) = b. g(f(v)) = c. g(g(x)) =

**13. If f(x) = x2 – 4x + 6, find f(0), f(2), f(-2), f(a), f(-a), f(x + 1), f(2x), and 2f(x) – 2.**

**14. If , find f(5), f(9), f(a + 2), f(-x), f(x2), and [f(x)]2.**

**Domain and Range**

**1. For what value of x is the function undefined?**

**2. Find the domain of the function.**

a.

b.

c.

d.

e. f(x) = t2 – 2t + 5

f. g(x) = 7x + 15

g.

h.

i.

j.

k.

**Trigonometric Functions**

**1. Solve the following for the indicated variable.**

a. b. c.

**2. Evaluate all six trigonometric functions for each θ.**

θ

s

2s

s

s

θ

s

2s

θ

**3. Solve for θ from . Leave all answers in terms of radians.**

a. b. c.

d. e. f.

g. h. i.

j. k. l.

m. n. o.

**4. Evaluate each trigonometric function.**

a. b. c.

d. e. f.

**5. Factor the expression.**

a.

b.

c.

d.

**6. Simplify**

**7. Solve**

**8. Find the exact value of**

**9. Find the solution of the equations for .**

a. e. f.

**10. Which of the following expressions are identical?**

a. cos2x b. (cosx)2 c. cosx2

**11. Which of the following expressions are identical?**

a. (sinx)-1 b. arcsinx c. sinx-1

**Exponents and Logarithms**

**1. Write the equations in logarithmic form.**

a. 26 = 64 b. c. 10x = 74

**2. Evaluate the following.**

a. b. c.

d. e. f.

g. h. i.

j. k. l.

m. n. o.

**3. Expand the logarithmic expressions.**

a. b. c.

**4. Combine into a single logarithm.**

a. log 6 + 4 log 2 b. log x + log (x2y) + 3log y c.

**5. Solve for x.**

a. 2x = 64 b. 10x = 1000 c.

d. e. f.

g. h. i.

j. k. l.

m. n. 23x – 5 = 7 o. 55 – 3x=26

p. ln(2x – 3) = 14 q. r. 21 – x = 32x + 5

s. log x + log(x + 1) = log 12 t. log8(x+5) – log8(x – 2) = 1

**6. Express y in terms of x.**

a. b. c.

**Graphs**

**1. Sketch the graphs of y = x2 – 4x + 3 and x – 2y = –6 on the same set of axes. Find the coordinates of each intersection point.**

**2. Sketch the graph of each function.**

a. b.

**3. If f(x) = x2 – 1, describe in words what the following would do to the graph of f(x).**

a. f(x) - 4 b. f(x – 4) c. –f(x + 2)

d. 5f(x) + 3 e. f(2x) f.

**4. Sketch the graph of the following functions**

a. (𝑥) = 1 – 2𝑥

b.

c.

d.

e.

f.

g.

h.

i.

j.

**5. Sketch the graph of the indicated translations of on the same axis. Use a different color for each equation.**

a. f(x) + 2 b. f(x+2) c. –f(x)

d. f(-x) e. 0.5f(x) f. 2f(x)

**6. Sketch the graph of the indicated translations of on the same axis. Use a different color for each equation.**

a. f(x) + 2 b. f(x+2) c. –f(x)

**7. Sketch the graph of the indicated translations of on the same axis. Use a different color for each equation.**

a. f(x) + 2 b. f(x+2) c. –f(x)

d. f(-x) e. 0.5f(x) f. 2f(x)

**8. Sketch the graph of the indicated translations of on the same axis. Use a different color for each equation.**

a. f(x) + 2 b. f(x+2) c. –f(x)

**9. Sketch the graph of the indicated translations of on the same axis. Use a different color for each equation.**

a. f(x) + 2 b. f(x+2) c. –f(x)

**10. Graph the following translations of for at least two periods.**

**11. Graph the following translations of for at least two periods.**

a.

b.

c.

d.

e.

f.

**12. Graph the following translations of for at least two periods.**

a.

b.

c.

d.

e.

f.

**Geometry**

**1. The sides of a rectangle are *x* and 3 – 2*x*. 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.**

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

**3. Give the dimensions of three different rectangles with area 6 cm2.**

**4. 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.**

**5. Sketch the graph of the circle x2 + (y – 2)2 = 25. Find the circumference and the area of the circle.**

**6. Find the surface area of a box of height *h* whose base dimensions are *p* and *q*, and that satisfies the following conditions:**

a. The box is closed.

b. The box has an open top.

c. The box has an open top and a square base with side length *p*.

**7. A piece of wire 5 inches long is to be cut into two pieces. One piece is x inches long and is to be bent into the shape of a square. The other piece is to be bent into the shape of a circle. Find an expression for the total area made up by the square and the circle as a function of x.**

**8. A car travels 360 miles in a period of 180 minutes. Find the average velocity of the car in miles per hour over this time period.**

**9. A 20 foot ladder rests against a building 15 feet from the floor. How far does the ladder extend from the base of the wall? What angle does the ladder make with the ground?**