CBGS Calculus (MTH 175 & MTH 176) Name: _____
Summer Work 2013-14
40 pts

Part 1: Equations/Expressions/Functions/Graphs

Directions:

- This assignment will be your first grade for the first nine-weeks and is due the first day class. There will be a penalty of 1 pt for each day the assignment is late.
- This is an honor code assignment. If you want to talk to someone, talk to me. If you want to talk to someone, contact your instructor at their CBGS email.
- Each problem will be worth 1 pt.
- Use a graphing calculator and get very comfortable with it.
- Show all necessary work to justify your answers. Unless you are specifically told to use the calculator, mysteriously appearing answers will be awarded ½ credit.
- If you need to do work on a separate page, make sure the problems are numbered, organized, and worked in the order of the packet. In addition, write on the printed copy "see attached work."
- All work should complete, neat, and well-organized. If your process and answer are not obvious from your work, you may lose credit.
- There are some relatively simple ideas in these pages that you may have never seen before or that you haven't seen for a while. That means that I want you to dig a little to learn how to do the problems. It will help you in the long run during the course of the year.

1. Write the equation of the line that passes through the points (2, -4) and (4, 2).

2. Write the equation of a line perpendicular to the line that contains the points (5, -1) and (2, 5), but passes through the point (-3, 6).

3. Solve for x: $y = \frac{2x}{x-1}$

4. Solve the quadratic using the quadratic formula: $2x^2 - 5x + 4 = 0$.

5. Use a graphing calculator to approximate **all** zeros to the polynomial equation below. Round any decimal answers to three decimal places.

$$x^3 - 2x^2 - 4x - 1 = 0$$

6. Use a graphing calculator to find the x-values of **all** of the intersection of the two equations below. Round any decimal answers to three decimal places.

$f(x) = e^{x-1}$
$g(x) = x^2$

7. If $f(x) = x^2 + 1$ and $g(x) = 2x - 5$, find $f[g(x)]$.

8. Factor: $6x^2 + 11x - 10$

9. Convert to rational exponent form: $\dfrac{2}{\sqrt[3]{x^2}}$

10. Convert to radical form: $4x^{-1/2}$

11. Evaluate the trigonometric expression. Leave your answer exact (no decimals).

$$\tan\left(\frac{\pi}{3}\right)=$$

12. Evaluate the trigonometric expression. Leave your answer exact (no decimals) and in terms of π.

$$\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)=$$

13. List all values of x on $0\le x\le 2\pi$ such that $\sin x=0$.

14. Simplify the trigonometric expression: $\dfrac{\sec x}{\csc x}$

15. Verify the following identity: $\tan x+\cot x\equiv \csc x\cdot \sec x$

16. Find the inverse of the function: $f(x)=2\cos(3x)-4$

17. Rewrite the following exponential equation as a logarithmic equation:

$2^x = 312$

18. Rewrite the following logarithmic equation as an exponential equation:

$\log_5 y = 4.5$

19. Simplify the expression: $e^{\ln(5x-1)}$

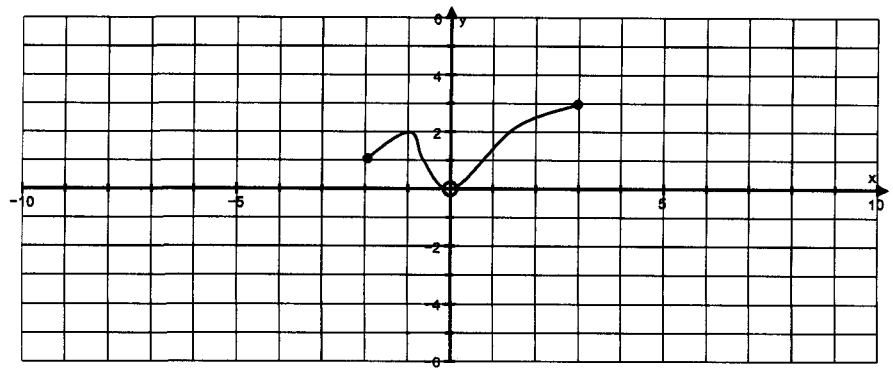
20. Use properties of logarithms to completely expand the expression:

$\ln\left(\frac{x^2}{2x+3}\right)$

21. Solve the exponential equation for x. Show all steps and do not convert the final answer to a decimal.

$4e^{3x} = 100$

22. Given a graph of some function, $f(x)$, sketch the requested $y = f(x+3)-4$.



23. Expand: $(x+h)^2$

24. Expand: $(x+h)^3$

25. Complete the square on the following: x^2+6x-5

26. Use long division to determine the quotient:

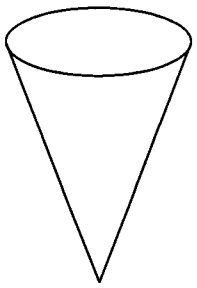
$(6x^3+13x^2+x+6)\div(3x-1)$

27. Shown below is a table of values for some function, $f(x)$. Determine the slope of the line that passes through the values of $x = 2$ and $x = 5$.

x	y
-1	2
2	6
4	12
5	15
8	24

28. Car A passes through an intersection traveling north at a constant speed of 60 miles per hour. Fifteen minutes later, car B passes through the same intersection traveling east at 50 miles per hour. How far apart will the two vehicles be 15 minutes after car B passes through the intersection?

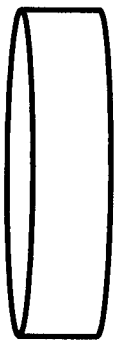
(29-30) Shown below is a cone with a diameter of 10" and a height of 20".



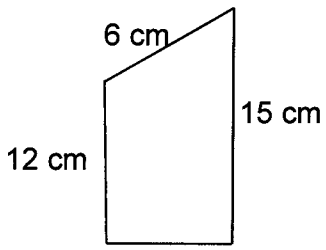
29. What is the volume of the cone when it is full?
Use the formula: $V = \frac{1}{3}(area\ of\ base)(height)$

30. What is the diameter of the top of the water if the cone is ¾ of the way full by height?

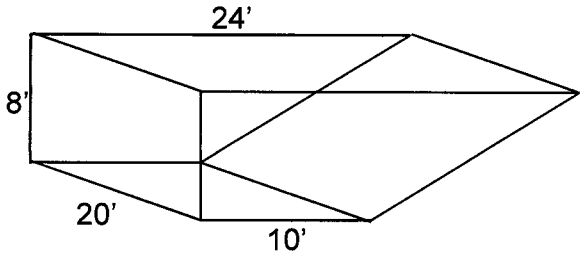
31. The disk shown has a thickness of 2 inches and a radius of 9 inches. What is the volume of the disk? Leave your answer exact and in terms of π.



32. What is the area of the figure shown below?



33. Shown below is a sketch for an in-ground swimming pool. How many cubic feet of water will it take to completely fill the pool?



(34-35) The table below shows the position and speed of an object at a given time. Use the values in the table to answer the questions that follow.

time (t) in seconds	position (s) in feet	velocity (v) in feet per second
0	0	5
1	4	8
3	8	8
5	14	2
7	12	0

34. Average velocity is defined as the rate of change of position. Algebraically, that becomes: $avg.veloc.=\frac{\Delta s}{\Delta t}$ or $avg.veloc.=\frac{s(t_2)-s(t_1)}{t_2-t_1}$. What is the average velocity of the object on the time interval from 1 to 5 seconds?

35. Average acceleration is defined as the rate of change of velocity. Algebraically, that becomes: $avg.accel.=\frac{\Delta v}{\Delta t}$ or $avg.accel.=\frac{v(t_2)-v(t_1)}{t_2-t_1}$. What is the average acceleration of the object from 3 to 5 seconds?

36. Use the function $f(x)=\frac{x+2}{2x-1}$ to answer the following questions:

a. Determine the equation of any vertical asymptote(s): _____

b. Determine the equation of any horizontal asymptote(s): _____

c. If the function has a hole, give the x-value of the hole. If it does not have a hole, write "none." _____

37. Use the function $f(x)=\frac{3x+2}{3x^2-13x-10}$ to answer the following questions:

a. Determine the equation of any vertical asymptote(s): _____

b. Determine the equation of any horizontal asymptote(s): _____

c. If the function has a hole, give the x-value of the hole. If it does not have a hole, write "none." _____

(38-39) Given the function or graph below, determine domain and range of the function. Use the calculator as needed. You may use either set notation or interval notation.

38. $f(x)=\sqrt{2x+7}$ Domain:

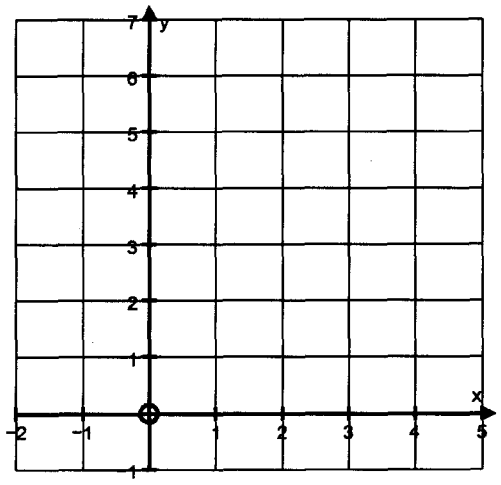
Range:

39. $f(x)=\dfrac{1}{x^2-1}$ Domain:

Range:

40. The four equations below enclose a region. Sketch the functions on the graph provided below and then shade the region enclosed by the equations.

$f(x)=x^2+2$
$x=1$
$x=2$
$y=2$



Part 2: Graphs

For the second part of the assignment, you will be creating a "library of functions" for the equations below (unless you already have created one from a previous course). To create the library of functions, use one sheet of graph paper, quartered, 4 graphs per side. Each graph should be titled by its name, its equation, and other pertinent information (slope, intercepts, asymptotes, period, domain, range, etc…).

This will not be taken for a grade, but is content you will be expected to reference throughout the year.

1. vertical line — $x = h$ (graph an example of, for example $x = 2$)
2. horizontal line — $y = k$ (graph an example of, for example $y = -3$)
3. linear — $f(x) = x$
4. absolute value — $f(x) = |x|$
5. quadratic — $f(x) = x^2$
6. cubic — $f(x) = x^3$
7. quartic — $f(x) = x^4$
8. sine function — $f(x) = \sin x$
9. cosine function — $f(x) = \cos x$
10. tangent function — $f(x) = \tan x$
11. exponential function — $f(x) = a^x$ (graph an example of, for example $y = 2^x$)
12. logarithmic function — $f(x) = \log_a x$ (graph an example of, for example $y = \log_3 x$)
13. circle — $x^2 + y^2 = r^2$ and $(x-h)^2 + (y-k)^2 = r^2$ (consider graphing $(x-2)^2 + y^2 = 25$)
14. square root — $f(x) = \sqrt{x}$
15. inverse — $f(x) = \frac{1}{x}$