

## Calculus Assignment

Problems with an # after the number are the only ones that a calculator is required for in the solving process.

### Instructions:

- Make sure all problems are numbered in order.
- All work is in pencil, and is shown completely.
- Graphs are drawn out by hand.
- If you use your calculator for some steps, intermediate work should be shown. There are no problems here that should be done solely on the calculator.
- Assignment is to be handed in on the first day of school, regardless of whether or not you have class. You will receive only ½ credit if the assignment is handed in a day late. If it is more than two days late you will receive no credit.
- There will be a test covering this material on the second day class meets.
- You are responsible for knowing all the material covered by this assignment as it is a review of past courses. If you do happen to have any questions on the assigned material, I will be available at school the two days before classes start. You will not have time to ask questions on the day the assignment is due.

### Other information you should know:

- ❖ Calculus is performed in radians only. Therefore you should know the unit circle in radians. A copy is attached for review.
  - ❖ A list of trigonometric identities is also attached, these should also be known, as we use substitutions to perform some problems.
  - ❖ You should be comfortable solving equations of various forms: linear, quadratic, polynomial, rational, radical, exponential or trigonometric. (Quadratics you should be comfortable solving by factoring and the quadratic formula)
  - ❖ You should be able to graph the following, and identify important points (origin, zeros, intercepts, period, asymptotes) without a calculator.
    - $y = \sin x$
    - $y = \cos x$
    - $y = \tan x$
    - all lines
    - $y = \ln x$
    - $y = \log x$
    - $y = e^x$
    - $y = a^x$
    - $y = \sqrt{x}$
    - $y = x^2$
    - $y = x^3$
    - piecewise functions
    - $y = |x|$
- You should also have an understanding of the transformations that can be applied along with their resulting effects on parent function (i.e.  $y = af(b(x+h)) - k$ )
- ❖ On your calculator you should be able to find max/min, zeros, and intersections, along with graphing parametrically, editing/inputting lists, graph using STAT PLOT, understand the different zoom features, and VARS button

In exercises 1-4, let L be the line determined by points A and B. (a) Plot A and B. (b) Find the slope of L. (c) Draw the graph of L.

1.  $A(1,-2), B(2,1)$       2.  $A(-2,-1), B(1,-2)$       3.  $A(2,3), B(-1,3)$       4.  $A(1,2), B(1,-3)$

In exercises 5-8, write an equation for (a) the vertical line and (b) the horizontal line through the point P.

5.  $P(2,3)$       6.  $P\left(-1, \frac{4}{3}\right)$       7.  $P(0, -\sqrt{2})$       8.  $P(-\pi, 0)$

In exercises 9-12, write a general linear equation for the line through the two points.

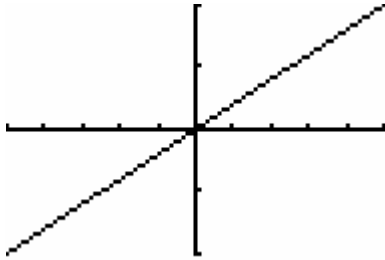
9.  $(0,0), (2,3)$       10.  $(1,1), (2,1)$       11.  $(-2,0), (-2,-2)$       12.  $(-2,1), (2,-2)$

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In exercise 13, the line contains the origin and the point in the upper right corner of the graph. Write an equation for the line.

13.



$[-5,5]$  by  $[-2,2]$

In exercises 14-17, find the (a) slope and (b) y-intercept, and (c) graph the line.

14.  $3x + 4y = 12$

15.  $x + y = 2$

16.  $x/3 + y/4 = 1$

17.  $y = 2x + 4$

In exercises 18-21, write an equation for the line through P that is parallel to L, (b) perpendicular to L.

18.  $P(0,0), L: y = -x + 2$

20.  $P(-2,4), L: x = 5$

19.  $P(-2,2), L: 2x + y = 4$

21.  $P(-1,1/2), L: y = 3$

In exercise 22, find the value of x or y for which the line through A and B has the given slope m.

22.  $A(-2,3), B(4, y), m = -2/3$

In exercises 23-27: (a) Find the domain. (b) Find the range. (c) Draw its graph. (d) Determine any symmetries that are characteristics of the graph.

23.  $y = 4 - x^2$

25.  $y = 2 + \sqrt{x-1}$

27.  $y = \sqrt[3]{x-3}$

24.  $y = x^2 - 9$

26.  $y = -\sqrt{-x}$

In exercises 28-31, determine whether the function is even, odd or neither.

28.  $y = x$

30.  $y = x + x^3$

31.  $y = \frac{x}{x^2 - 1}$

29.  $y = x + 2$

For problems 32-34, (a) draw the graph of the function. Then find its (b) domain and (c) range.

32.  $f(x) = -|3 - x| + 2$

33.  $f(x) = \begin{cases} 3 - x, & x \leq 1 \\ 2x, & 1 < x \end{cases}$

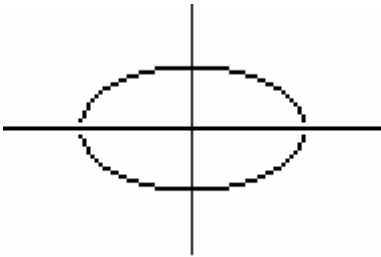
34.  $f(x) = \begin{cases} 1, & x < 0 \\ \sqrt{x}, & x \geq 0 \end{cases}$

Calculus Assignment

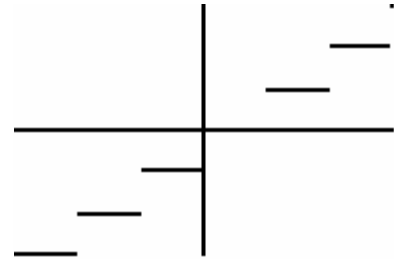
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For problems 35-38, use the vertical line test to determine whether the curve is the graph of a function.

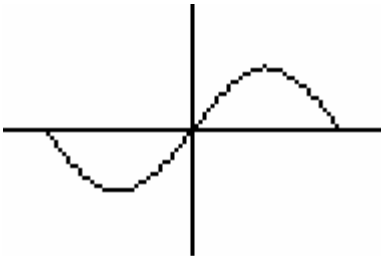
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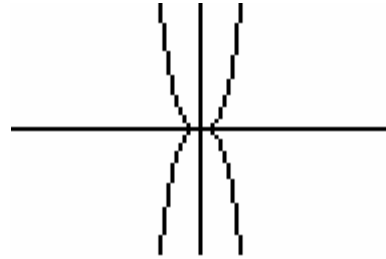
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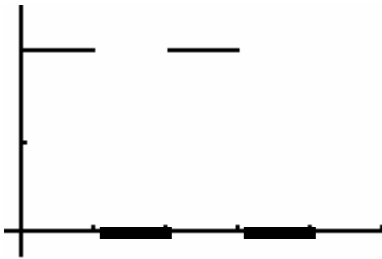


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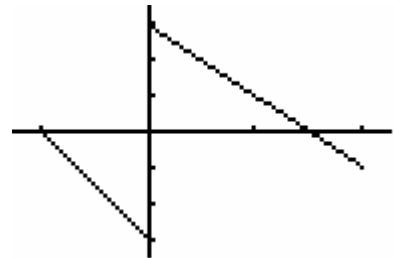


In exercises 39-40, write the piecewise formula for the function.

39.



40.



In exercise 41, find:

(a)  $f(g(x))$ , (b)  $g(f(x))$ , (c)  $f(g(0))$ , (d)  $g(f(0))$ , (e)  $g(g(-2))$ , (f)  $f(f(x))$

41.  $f(x) = x + 1$ ,  $g(x) = x - 1$

In exercise 42, graph the function. State its domain, range, and intercepts.

42.  $y = 3e^{-x} - 2$

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In exercises 43-52, solve the equations.

43.  $e^x = 4$  #

44.  $3 - 2^{-x} = 0$  #

45.  $\log_3 x = 6$

46.  $3x^3 - 6x^2 - 24x = 0$  (factor)

47.  $125x^3 - 27 = 0$  (factor)

48.  $9 + \sqrt{4x+8} = 11$

49.  $2(7x-1)^{1/3} - 4 = 0$

50.  $4x + x(x-3) = 0$

51. 
$$\begin{cases} x + 2y = 2 \\ 5x - 3y = -29 \end{cases}$$

52. 
$$\frac{3}{y-2} + \frac{2y}{4-y^2} = \frac{5}{y+2}$$

In exercise 53, find  $f^{-1}$ , and verify that  $f^{-1}(f(x)) = f(f^{-1}(x)) = x$ .

53.  $f(x) = 2x + 3$

In exercise 54, draw the graph and determine the domain and range of the function.

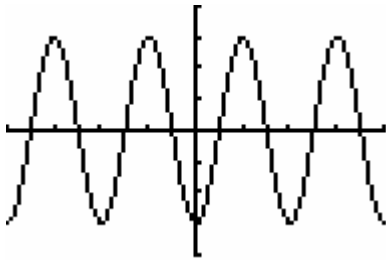
54.  $y = 2 \ln(3-x) - 4$

In exercise 55, solve for  $y$ .

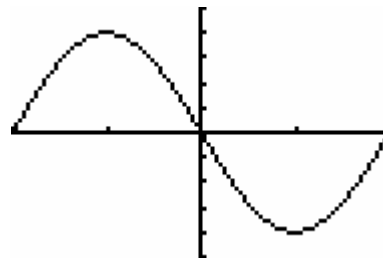
55.  $\ln y = 2x + 4$

In exercises 56-77, specify (a) the period, and (b) the amplitude.

56.  $y = -3 \cos(2x)$



57.  $y = -4 \sin\left(\frac{\pi}{3}x\right)$



In exercise 58, determine (a) the period, (b) the domain, (c) the range, and (d) draw the graph of the function.

58.  $y = -3 \tan(3x + \pi) + 2$

In exercises 59-60, solve the equation in the specified interval. A calculator is necessary.

59.  $\tan x = 2.5, 0 \leq x < 2\pi$  #

60.  $\sec x = -3, -\pi \leq x < \pi$  #

## Trigonometric Identities

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

$$\sec^{-1}(x) = \cos^{-1}\left(\frac{1}{x}\right)$$

$$\csc^{-1}(x) = \sin^{-1}\left(\frac{1}{x}\right)$$

$$\cot^{-1}(x) = \tan^{-1}\left(\frac{1}{x}\right)$$

$$\cot^{-1}(x) = \frac{\pi}{2} - \tan^{-1}(x)$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$1 + \cot^2 \theta = \csc^2 \theta$$

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$$

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$\cos 2\theta = 1 - 2 \sin^2 \theta$$

$$\cos 2\theta = 2 \cos^2 \theta - 1$$

$$\cos^2 \theta = \frac{1 + \cos 2\theta}{2}$$

$$\sin^2 \theta = \frac{1 - \cos 2\theta}{2}$$

# Unit Circle

Name: key

Fill in the angles in both degrees and radians. Then write the exact ordered pair for each angle where it intersects the circle.

