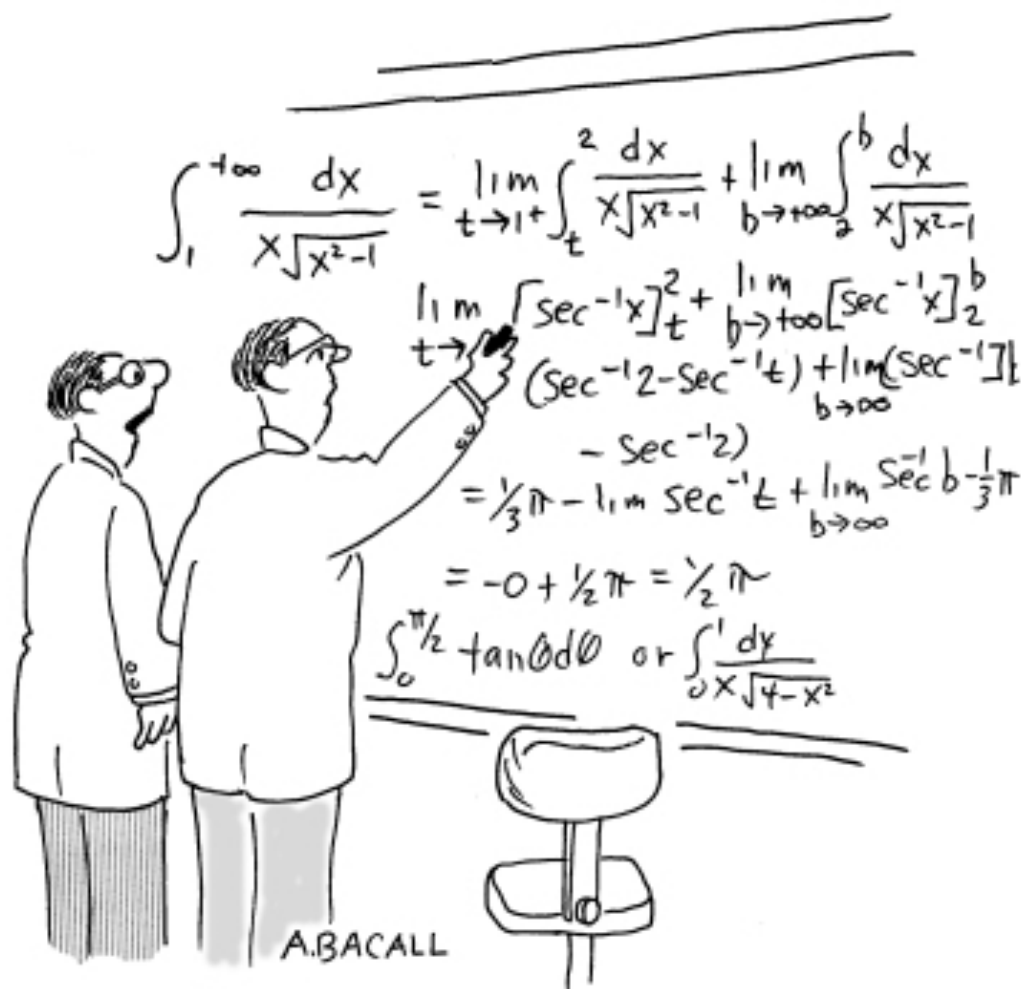


# Calculus Summer Packet



**"Okay, you've proven your point.  
Spare me the details."**

The accompanying problems are from the subjects covered in Algebra I, Algebra II, Pre-calculus, and Analytic Geometry. In Calculus you are expected to know all topics from these subjects.

Included in this packet is a test that will be collected on the first day of school. Problems from this packet will be included in the first test given in the Calculus class. Good luck and have fun.

# **Calculus Summer Packet**

## **PCTI Mathematics Department Catiana G. Valik, *Supervisor* Summer Packet Grading**

- On the first day of school, the teacher will check for completion/effort of the packet.
- **This will be weighted at 50%.**
- Teacher will then review the packet with the students.
- Upon completion of the review, the students will be given an assessment based on the summer packet.
  - **The assessment will be weighted at 50%.**
  - **The two weighted scores combined will count as one project grade.**
- Therefore, the grade for the summer packet will be placed under the “project” category.

# Calculus Summer Packet

Show all your work.

**Part 1: Solving Equations:** Solve for x

1.  $\frac{3}{4}x + \frac{5}{6} = 5x - \frac{125}{3}$

2.  $\frac{6x-7}{4} + \frac{3x-5}{7} = \frac{5x+78}{28}$

3.  $x^3 - 6x^2 - 27x = 0$ .

4.  $\sqrt{x+1} - 3x = 1$

5.  $-\frac{2}{x^2} + \frac{1}{2(x-3)^2} = 0$ .

6. Solve the following quadratic equations. Give exact answers.

a.  $x^2 + 3x = 2$

b.  $5x^2 - 2x + 1 = 0$

c.  $3x^2 = 5x - 6$

**Part 2: Equation of a line**

7. For each of the following find the equation of the line satisfying the given information.

Write your answers in point-slope form.

a. Line through the point (2, 3) with slope of  $-\frac{2}{3}$ .

b. Line through the points (2, 3) and (-3,2).

c. The vertical line through the point (-3,2).

d. The horizontal line through the point (-3,2).

e. The line through the point (2, 3) that is parallel to the line  $2x - 5y = 4$ .

f. The line through the point (2, 3) that is perpendicular to the line  $2x - 5y = 4$ .

# Calculus Summer Packet

## Part 3: Simplify Expression

8. Rationalize the numerator:  $\frac{\sqrt{x+4}-2}{x}$

9. Simplify the difference quotient  $\frac{f(x+h)-f(x)}{h}$  for each of the following functions:

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

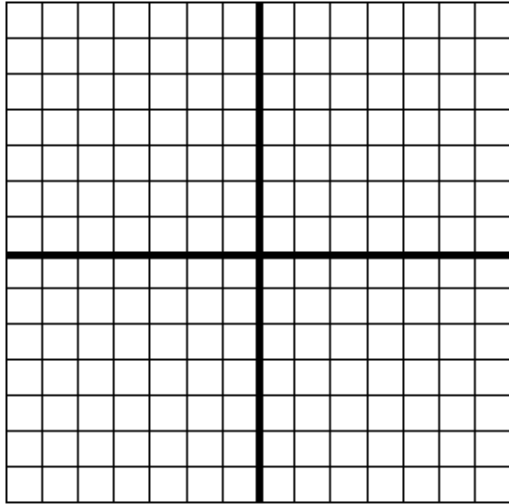
b.  $f(x) = \frac{1}{x+2}$

c.  $f(x) = \sqrt{x+2}$

# Calculus Summer Packet

**Part 4: Transformations:** Sketch the following graphs

10. The function of  $f(x)$  is defined:  $H(x) = \begin{cases} 1, & x > 0 \\ -1, & x < 0 \end{cases}$



Sketch the following graphs:

a.)  $H(x) + 3$

b.)  $H(x - 1)$

c.)  $-2H(x)$

d.)  $-H(x - 1) + 3$

**Part 5: Operations with functions:**

Find each of the following functions or values given  $f(x)$  and  $g(x)$ :

$$f(x) = 1 - x^2$$

$$g(x) = 2x + 1$$

11.  $f(x) - g(x)$

14.  $g(f(5))$

12.  $f(x)g(x)$

15.  $f(g(x))$

13.  $f(g(1))$

16.  $g(f(x))$

17.  $g(g(x))$

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**Part 6: Odd, Even, and Inverse Functions:** Determine whether each function is odd, even, or neither

18. Is this function odd, even, or neither?

$$f(x) = x^6$$

19. Is this function odd, even, or neither?

$$f(x) = \cos(\cos(x))$$

20. Is this function odd, even, or neither?

$$f(x) = \sin(x)$$

21. If  $f(x) = \sqrt{5x - 7}$ , find the inverse.

22. If  $f(x) = \frac{6-5x}{7}$ , find the inverse.

23. If  $f(x) = 6^{3+2x}$ , find the inverse.

**Part 7: System of Equations:** Find where the graphs intersect

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

$$g(x) = -.5x + 7$$

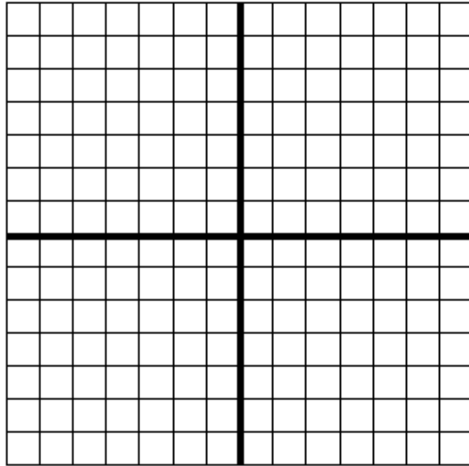
25.  $f(x) = x^2$

$$g(x) = x + 2$$

# Calculus Summer Packet

**Part 8: Piecewise Functions:** Sketch the graph of  $f(x)$  and find the indicated values:

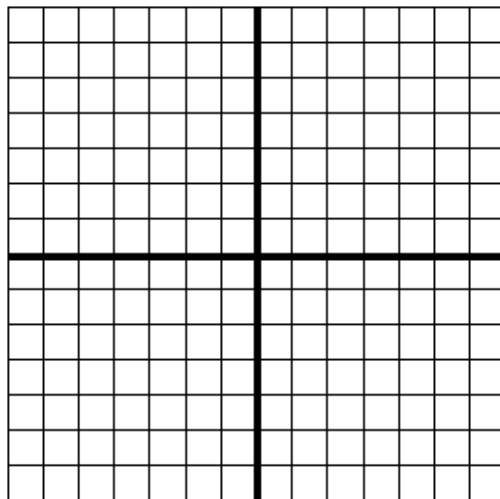
$$26. f(x) = \begin{cases} x - 2, & x < 0 \\ x^2 + 1, & x \geq 0 \end{cases}$$



- a.  $f(-4)$
- c.  $f(f(-3))$

- b.  $f(0)$
- d.  $f(f(0))$

$$27. f(x) = \begin{cases} 6 - x, & x \leq 3 \\ 3x - 6, & x > 3 \end{cases}$$



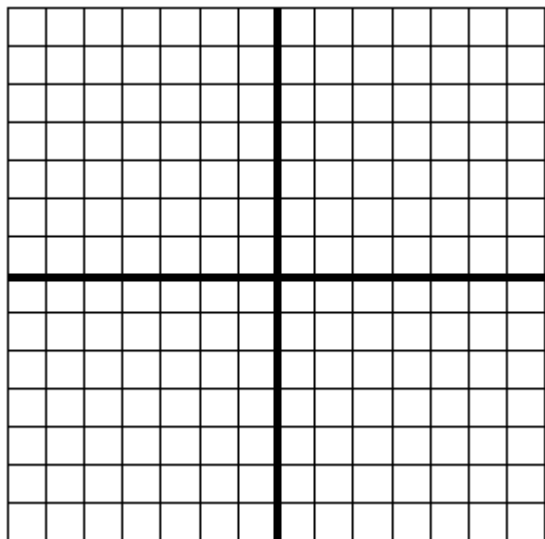
- a.  $f(3)$
- c.  $f(f(0))$

- b.  $f(5)$
- d.  $f(f(-1))$

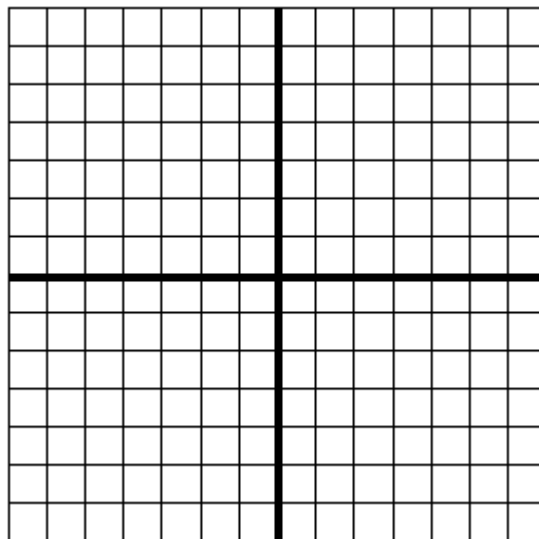
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**Part 9: Function Types:** Name the function, find its domain and range, zeroes, and graph it

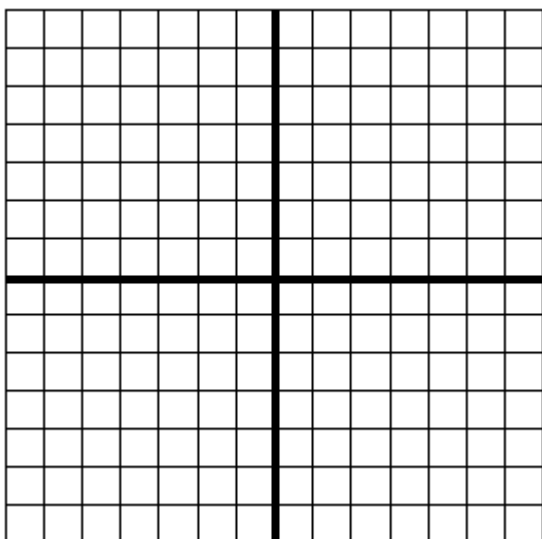
28.  $4x - 3y = 6$



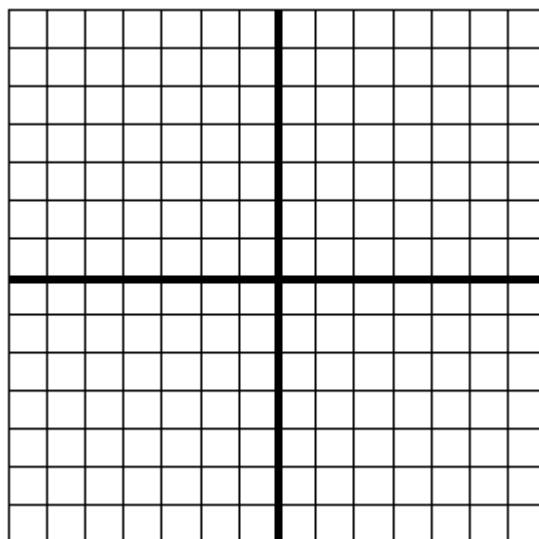
29.  $f(x) = x^2 - 2x - 3$



30.  $y = x^3 - 8$



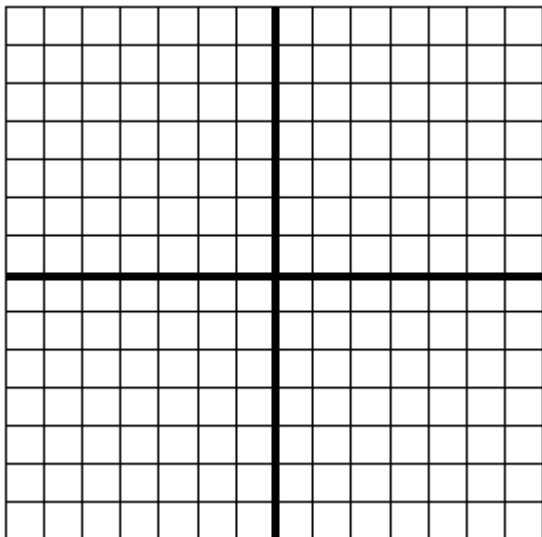
31.  $y = 2^x$



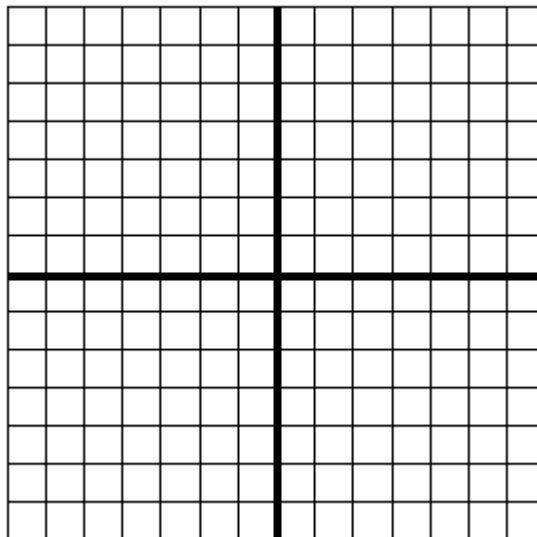


# Calculus Summer Packet

32.  $f(x) = \frac{2}{x-3}$



33.  $f(x) = e^x + 3$



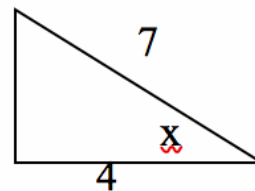
## Part 10: Solving problems involving trigonometry

34. Use the given triangle to find:

a.  $\sin x =$

b.  $\cos x =$

c.  $\tan x =$



d.  $\csc x =$

e.  $\sec x =$

f.  $\cot x =$

35. Evaluate the following without using the calculator.

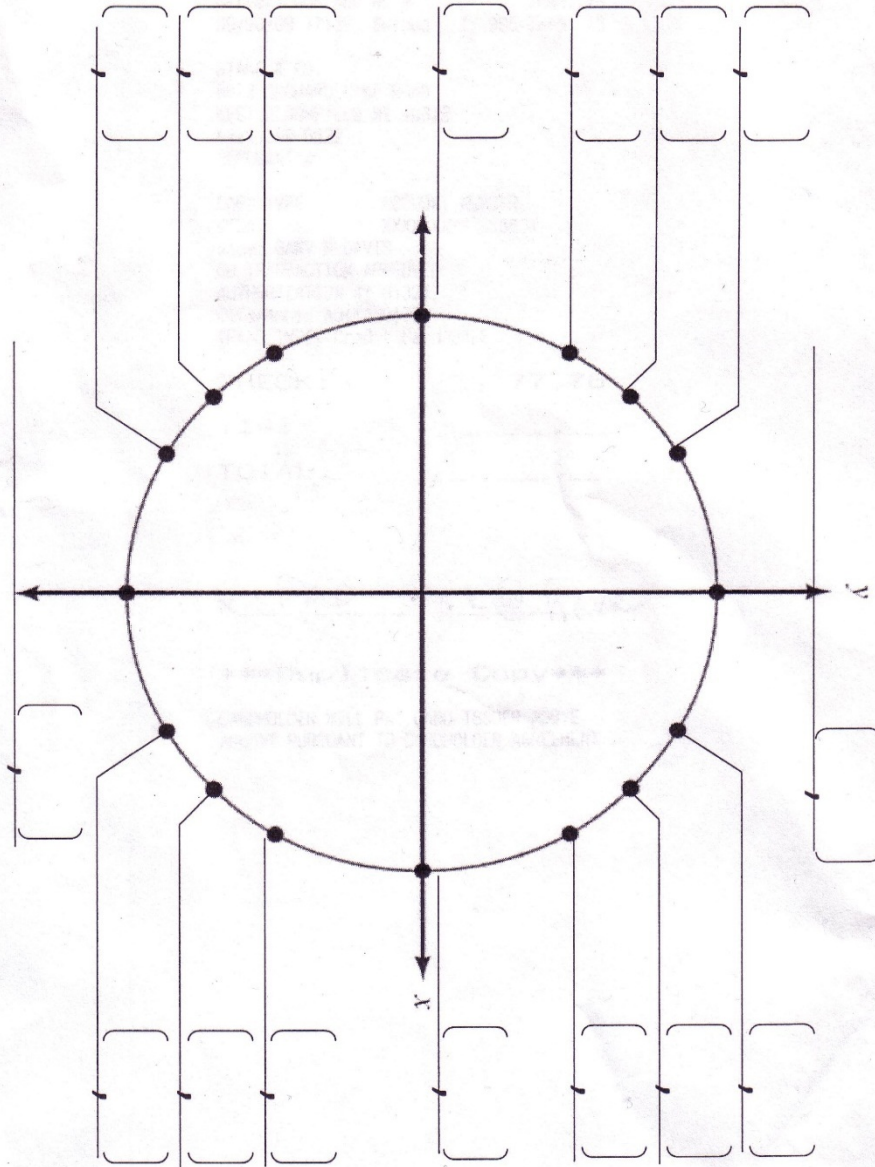
$$\sin 0 = \underline{\hspace{1cm}} \quad \cos \frac{\pi}{4} = \underline{\hspace{1cm}} \quad \sin \frac{3\pi}{4} = \underline{\hspace{1cm}} \quad \cos(-\pi) = \underline{\hspace{1cm}} \quad \sin \frac{7\pi}{6} = \underline{\hspace{1cm}} \quad \tan \frac{2\pi}{3} = \underline{\hspace{1cm}}$$

36. Evaluate the following without using the calculator.

$$\arcsin \frac{1}{2} = \underline{\hspace{1cm}} \quad \cos^{-1} \left( -\frac{\sqrt{2}}{2} \right) = \underline{\hspace{1cm}} \quad \arctan(-\sqrt{3}) = \underline{\hspace{1cm}}$$

# Calculus Summer Packet

Part 11: Unit Circle: Fill in the unit circle; label degrees, radians,  $(\cos x, \sin x)$



Unit Circle  
Label degrees, radians,  $(\cos x, \sin x)$       NAME \_\_\_\_\_

# Calculus Summer Packet

Resources:

<http://www.calcchat.com/book/Calculus-9e/>

[http://apcentral.collegeboard.com/apc/public/courses/teachers\\_corner/2178.html](http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/2178.html)

<http://www.calculus.org/>

<http://cow.math.temple.edu/>

<http://www.mathsisfun.com/calculus/>

<http://www.wolframalpha.com/widgets/view.jsp?id=dc816cd78d306d7bda61f6facf5f17f7>

<http://www.wolframalpha.com/widgets/view.jsp?id=c44e503833b64e9f27197a484f4257c>