Summer Assignment for AP Calculus AB

The attached is the assignment for the summer in preparation for the year is AP Calculus. The assignment includes the following worksheets:

- Review of Functions
- Log Worksheet
- Exponential Functions
- Equations With Radicals
- Quadratic Equations
- Right Triangle Relationships
- Trig Identity Review Sheet
- Piecewise Function Worksheet
- Summer Assignment Answer Sheet

For the best review, this assignment should be started in late July/early August. Do not put it off to the last minute. Do all your work on a separate sheet of paper, but all final answers must be put on the Answer Sheet with the exception of the Piecewise Function Worksheet. On the first day of class you are expected to have this assignment completed. Be prepared to turn in your answer sheet stapled to the work. Failure to accomplish this assignment can result in being removed from the AP Calculus AB course. If you have questions, you may contact me at rhilton@southlandscs.com during the summer. I don't check this email daily during the summer so please allow some time for a response.

AP Calculus AB Summer Assignment Answer Sheet

Name:______________________________

Please put all final answers on this sheet. Attach work on separate sheets of paper. Work should be organized so that it is clear which problem is being worked on. The answers for the piece-wise function sheet should be put on the worksheet and turned in separately.

Review of Functions

1)	2)	3)	4)	5)	6)
7)	8)	9)	10)	11)	12)
13)	14)	15)	16)	17)	18)
19)	20)	21)	22)	23)	24)
25)	26)	27)	28)	29)	30)
31)	32)	33)			

Log Worksheet

I.1)	2)
3)	4)
5)	6)
7)	8)

II.1)	2)	3)	4)	5)	6)
7)	8)	9)	10)		

Exponential Functions

II.1)	2)	3)	4)	5)	6)

7)	8)	9)	10)	11)	12)
13)	14)	15)	16)	17)	18)
19)	20)	III. 1)	2)	3)	4)
5)					

Equations With Radicals

1)	2)	3)	4)	5)	6)
7)	8)	9)	10)	11)	12)
13)	14)	15)	16)	17)	18)
19)	20)	21)	22)	23)	24)
25)	26)	27)			

Qudratic Equations

1)	2)	3)	4)	5)	6)
7)	8)	9)	10)	11)	12)
13)	14)	15)	16)	17)	18)
19)	20)	21)	22)	23)	24)

Right Triangle Relationships

1)	2)	3)	4)	5)	6)
7)	8)	9)			

Review of Functions

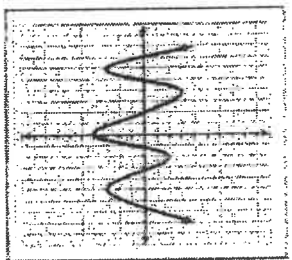
I. Practice Problems

Determine if the relation is a function

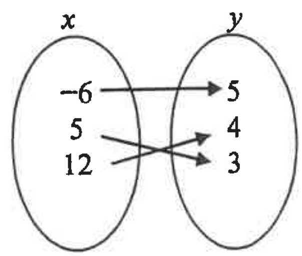
1. $\{(8,5),(6,7),(0,-3),(2,1),(6,5)\}$

2. $\{(-7,5),(-1,5),(3,4),(5,8),(10,3)\}$

3.



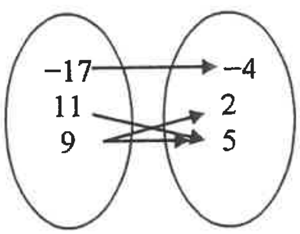
4.



5. $y = (x-8)^2$

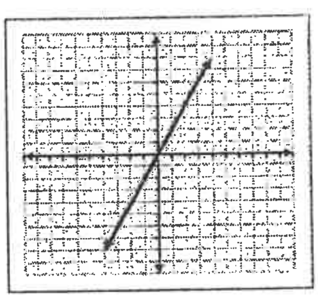
Determine the Domain and Range of each relation.

6.



7. $\left\{\left(-9,\frac{1}{5}\right),\left(-2,\frac{1}{5}\right),\left(10,\frac{1}{3}\right),\left(11,\frac{1}{3}\right)\right\}$

8.



9. $y = x^2 + 3$

Evaluate.

10. If $g(x) = \frac{3}{5}x + 12$, find $g(-10)$.

11. If $h(x) = \frac{-4x+6}{2}$, find $h\left(\frac{3}{4}\right)$.

12. If $g(x) = 5x^2 + 8$, find $g(4)$.

13. If $h(x) = 14 - 5|3x + 1|$, find $h\left(-\frac{2}{3}\right)$.

14. If $g(x) = \frac{3x^2+6x}{2}$, find $g(3)$.

15. If $f(x) = \sqrt{x - 16}$, find $f(20)$.

16. If $h(x) = 3^x$, find $h(-4)$.

17. If $g(x) = 5^{x-3}$, find $g(3)$.

18. If $f(x) = -3x^2$ and $h(x) = 3x^2 + 8$, find $(f - h)(2)$.

19. If $h(x) = |3x + 4|$ find $2h(-5)$.

20. If $h(x) = x^4$ and $g(x) = x - 6$, find $(h \cdot g)(-3)$.

21. If $f(x) = 3x - 4$ and $g(x) = 2x + 2$, find $f(g(4))$.

22. If $f(x) = -2x + 4$ and $g(x) = \frac{1}{5}x + 4$, find $g(f(12))$.

23. If $g(x) = -12x^2 + 5$ and $h(x) = 5x + 3$, find $h\left(g\left(\frac{1}{2}\right)\right)$.

24. If $f(x) = 5x + 7$ and $g(x) = |3x + 5|$, find $f(g(-5))$.

25. If $f(x) = \sqrt{x - 3}$ and $g(x) = |3x|$, find $f(g(-4))$.

26. If $g(x) = x^3 - 14$ and $h(x) = \sqrt{x + 14}$, find $g(h(22))$.

27. If $f(x) = -2x$, $g(x) = \sqrt{2x}$, and $h(x) = |5x| - 2$, find $f\left(h\left(g(8)\right)\right)$.

Simplify.

28. If $g(x) = \frac{2}{5}x + 6$ and $h(x) = \frac{1}{3}x - 2$, find $(g + h)(x)$.

29. If $f(x) = 5x^2 - 13x + 6$ and $g(x) = 8x^2 + 3x + 2$, find $(g - f)(x)$.

30. If $g(x) = 16x - 12$ find $-\frac{3}{4}g(x)$.

31. If $g(x) = 3x^2 + 3$ and $h(x) = -2x + 4$, find $(g \cdot h)(x)$.

Solve.

32. Is $g(x) = \frac{1}{3}x - 2$ the inverse of $f(x) = 3x + 6$? Justify your answer.

33. Is $g(x) = 5x - 30$ the inverse of $f(x) = \frac{1}{5}x - 6$? Justify your answer.

LOG WORKSHEET (PROPERTIES OF LOGS)

I. Express the following in terms of log a, log b, log c.

1) $\log abc$

2) $\log ab^2c^3$

3) $\log\left(\frac{a^2b^5}{\sqrt{c}}\right)$

4) $\log a^2b^{-3}c^{\frac{1}{2}}$

5) $\log \frac{a^3}{\sqrt[3]{b^2c}}$

6) $\log \sqrt[4]{\frac{a^3\sqrt{c}}{b}}$

7) $\log \sqrt{a\sqrt{b\sqrt{c}}}$

8) $\log \left(a^{-1}b\right)^{-\frac{1}{2}}c^{-\frac{2}{3}}$

II. Simplify the following; write as a single log.

1) $\log a - 2\log b$

2) $2\log a + \frac{2}{3}\log b$

3) log 60 - log 4

4) 5 log 2 + 2 log 5

5) $\frac{1}{6}\log 8 - \frac{1}{4}\log 9 + \frac{1}{2}\log 24$

6) $\log(a+b) + \log(a-b)$

7) $\log \pi + 2\log r - \log 2$

8) $\log 1 + \log 2 + \ldots + \log(n-1) + \log n$

9) $\log(x+1) + \log(x-1) - \log(x^2 - x + 1) + \log(x^3+1) - \log(x^2-1)$

10) $-\log_b b^3 z + 2\log_b c - 3\log_b bc$

Exponential Functions Review

II. Practice Problems

Solve.

1. $4^x = 64$
2. $6^x = 216$
3. $3^{2x} = 81$
4. $4^x = 32$
5. $4^{4-5x} = 256$
6. $2^x = \frac{1}{16}$
7. $\left(\frac{1}{3}\right)^{3x} = 729$
8. $\left(\frac{1}{2}\right)^{3x+5} = 128$
9. $5^{4-x} = \frac{1}{625}$
10. $\left(\frac{2}{3}\right)^{2x-3} = \frac{8}{27}$
11. $4^{-3x+2} = 128$
12. $5^{3x} - 25 = 600$
13. $4^{\frac{x}{2}} + \frac{1}{64} = \frac{1}{32}$
14. $\left(\frac{1}{16}\right)^x + 13 = 77$
15. $3^{-2x} - 27 = 702$
16. $3^{-4x-3} + 57 = 300$
17. $\frac{1}{49}^{4x+3} + 16 = 65$
18. $12(3^{3x-4}) = 2916$
19. $4(2^{5x+7}) = \frac{1}{64}$
20. $3(5^{3x+1}) + 12 = 387$

III. Challenge Problems

1. $2^{3x+1} = 4^x$
2. $5^{4x-6} = 25^{6-x}$
3. $3^{x^2-42} = 3^{-x}$
4. $2^{x^2+8x-15} = 2^{8x+10}$

5. Find the error in the student's work.

$$4^{x+3} = 2^9$$
$$(2^2)^{x+3} = 2^9$$
$$2^{2x+3} = 2^9$$
$$2x + 3 = 9$$
$$2x + 3 - 3 = 9 - 3$$
$$\frac{2x}{2} = \frac{6}{2}$$
$$x = 3$$

Eqautions with Radicals Review

II. Practice Problems

Solve.

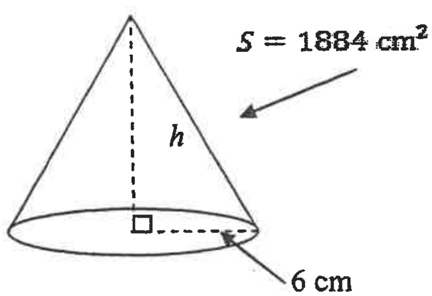
1. $\sqrt{x} = 8$
2. $\sqrt{2x} = 3$
3. $\sqrt{-4x} = -6$
4. $\sqrt{x+7} = 8$
5. $\sqrt{8-x} = 10$
6. $\sqrt{4x-7} = 15$
7. $3\sqrt{x} = 27$
8. $-5\sqrt{x+4} = 45$
9. $2\sqrt{x+6} = 14$
10. $\sqrt{2x-4} - 6 = -3$
11. $-4\sqrt{x+5} = -48$
12. $8\sqrt{7-3x} = 24$
13. $2\sqrt{x} - 8 = 12$
14. $-4\sqrt{x} + 11 = 3$
15. $3\sqrt{5x-26} + 6 = 15$
16. $-4\sqrt{9x-5} + 12 = 24$
17. $-5\sqrt{2x-8} - 6 = -36$
18. $-\frac{2}{3}\sqrt{4x-1} + 6 = -4$
19. $\frac{1}{4}\sqrt{6-5x} + 2 = 6$
21. $7\sqrt{3x+14} + 12 = -19$
20. $x-1=\sqrt{15-7x}$
22. $\sqrt{x+5}-1=\sqrt{x}$

III. Challenge Problems

Solve.

23. $\sqrt{2x^2-64} = x$
24. $\sqrt{10x^2-7} = 3x$
25. $\sqrt{x+2} + \sqrt{x} = 4$

26. The surface area of a cone is found with the formula $S = \pi r\sqrt{r^2+h^2}$. Find h for the cone below. Use $\pi = 3.14$.



27. Shown is a student's work. Find the error.

$$\begin{aligned} \sqrt{2x}+2 &= 8 \\ 2x+4 &= 64 \\ 2x &= 60 \end{aligned}$$

Quadratic Equations Review

II. Practice solving quadratics with the quadratic formula over the set of Complex numbers.

1. $x^2 - 4x - 7 = 0$
2. $x^2 + 6x + 13 = 0$
3. $a^2 - 7a - 10 = 0$
4. $x^2 + 4x + 2 = 0$
5. $a^2 - 5a + 8 = 0$
6. $x^2 - 3x + 10 = 0$
7. $b^2 - 7b - 3 = 0$
8. $3a^2 - 4a - 4 = 0$
9. $-c^2 - 6c + 8 = 0$
10. $2a^2 - 6a - 3 = 0$
11. $3d^2 - 5d + 6 = 0$
12. $4x^2 + 11x = 3x - 10$
13. $14 - 3a^2 = 2a$
14. $7 - 8z^2 = 6z + 16$
15. $3x^2 - 11x = 8 - 14x$
16. $2t^2 + 15 = 6t^2 - 5t$
17. $10x^2 - 11x + 9 = 13x - 6x^2$
18. $3t^2 + 8t + 5 = -2t^2$

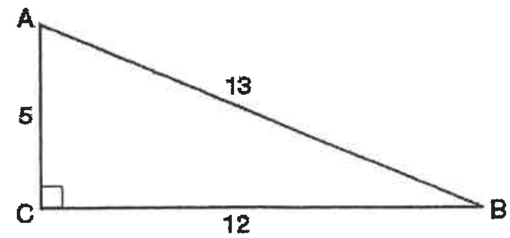
III. Challenge Problems

19. $x^4 + 13x^2 + 36 = 0$
20. $x^4 + 16x^2 - 225 = 0$
21. The height of a ball in feet can be found by the function $h(t) = -16t^2 + 80t + 5$ where t is the elapsed time in seconds. Find the time or times that the ball is 34 feet high to the nearest tenth of a second.
22. The height of a rocket in meters can be found by the function $h(t) = -4.9t^2 + 540t + 25$ where t is the elapsed time in seconds. Find the time or times that the rocket is 750 meters high to the nearest tenth of a second.
23. What value(s) of the discriminant result in one unique real solution?
24. What value(s) of the discriminant result in two unique imaginary solutions?

Right Triangle Relationships Review

Part III. *Writing Sine, Cosine, Tangent Ratios*

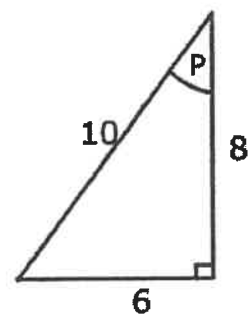
1) Which ratio represents cos A in the accompanying diagram of ΔABC?



(1) $\frac{5}{13}$ (3) $\frac{12}{5}$

(2) $\frac{12}{13}$ (4) $\frac{13}{5}$

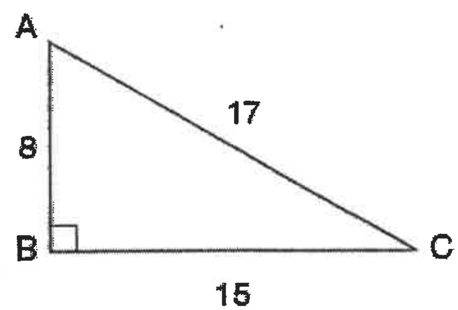
2) Which ratio represents sin P in the accompanying triangle?



(1) $\frac{6}{10}$ (3) $\frac{6}{8}$

(2) $\frac{8}{10}$ (4) $\frac{10}{6}$

3) In the accompanying diagram of right triangle ABC, $AB = 8$, $BC = 15$, $AC = 17$, and $m\angle ABC = 90$.

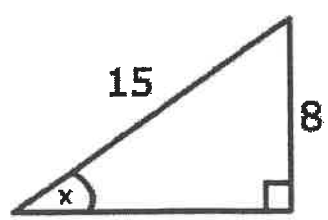


What is tan $\angle C$?

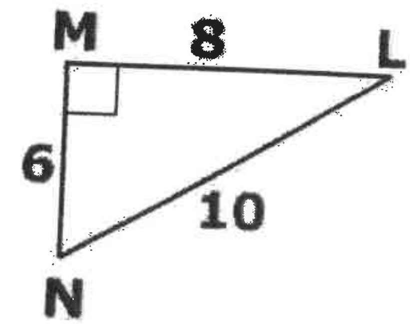
(1) $\frac{8}{15}$ (3) $\frac{8}{17}$

(2) $\frac{17}{15}$ (4) $\frac{15}{17}$

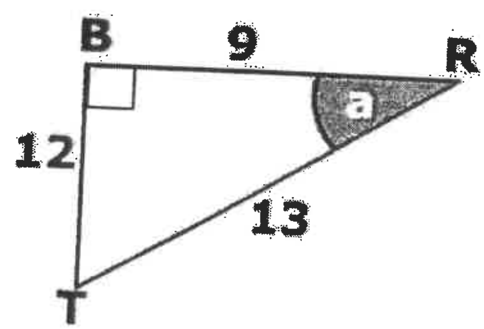
4) What is sin(x) ?



5) What is $\sin(L)$, $\cos(L)$ and $\tan(L)$?



6) What is $\sin(a)$, $\cos(a)$ and $\tan(a)$?



7) In triangle XYZ, $\angle y = 90^\circ$ XY = 7, YZ = 24, and XZ = 25, which ratio represents cosine of $\angle x$?

(1) $\frac{7}{24}$ (3) $\frac{7}{25}$

(2) $\frac{24}{25}$ (4) $\frac{24}{7}$

8) In triangle MCT, the measure of $\angle T = 90°$, $MC = 85$ cm, $CT = 84$ cm, and $TM = 13$ cm. Which ratio represents the sine of $\angle C$?

(1) $\frac{13}{85}$ (3) $\frac{13}{84}$

(2) $\frac{84}{85}$ (4) $\frac{84}{13}$

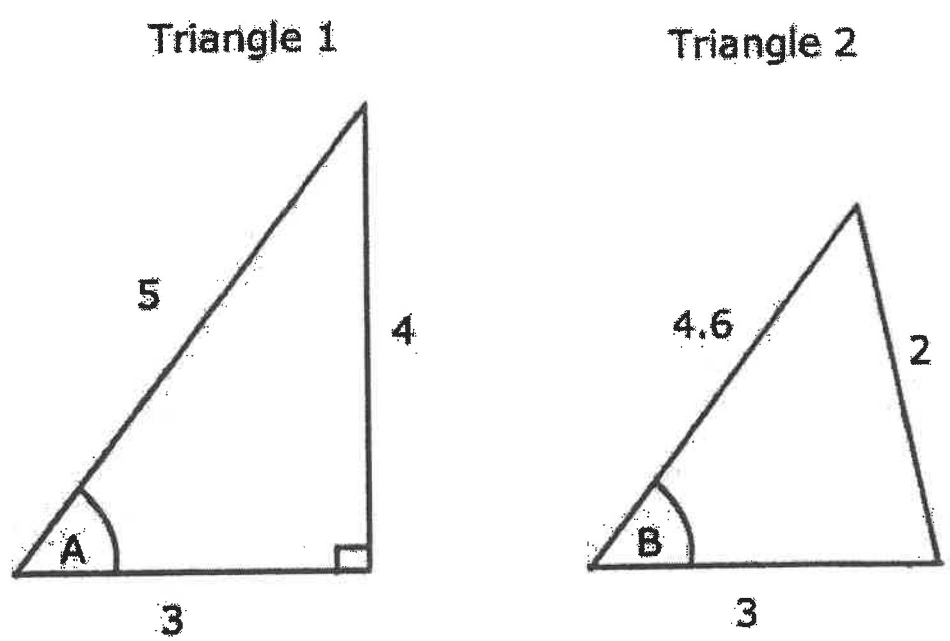
Error Analysis

A teacher asks the class if they can express the sin(A) in Triangle 1 and the sin(b) in triangle 2.

Jose says $\sin(A) = \frac{4}{5}$ and sin(b) does not exist.

Jenny says $\sin(A) = \frac{4}{5}$ and $\sin(B) = \frac{2}{4.6}$

Who is correct? (explain your reasoning)



Trig Identity Quiz

On the second day of class, you should expect a quiz on any of the trigonometric identities that are boxed on the next page. Please study these identities and make sure you know them. They can be asked in any order and in any form.

TRIGONOMETRY LAWS AND IDENTITIES

TANGENT IDENTITIES

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

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

RECIPROCAL IDENTITIES

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

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

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

PYTHAGOREAN IDENTITIES

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

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

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

PERIODIC IDENTITIES

$$\sin(\theta + 2\pi n) = \sin\theta$$

$$\cos(\theta + 2\pi n) = \cos\theta$$

$$\tan(\theta + \pi n) = \tan\theta$$

$$\csc(\theta + 2\pi n) = \csc\theta$$

$$\sec(\theta + 2\pi n) = \sec\theta$$

$$\cot(\theta + \pi n) = \cot\theta$$

EVEN/ODD IDENTITIES

$$\sin(-\theta) = -\sin\theta$$

$$\cos(-\theta) = \cos\theta$$

$$\tan(-\theta) = -\tan\theta$$

$$\csc(-\theta) = -\csc\theta$$

$$\sec(-\theta) = \sec\theta$$

$$\cot(-\theta) = -\cot\theta$$

DOUBLE ANGLE IDENTITIES

$$\sin(2\theta) = 2\sin\theta\cos\theta$$

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

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

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

$$\tan(2\theta) = \frac{2\tan\theta}{1 - \tan^2\theta}$$

HALF ANGLE IDENTITIES

$$\sin\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1-\cos\theta}{2}}$$

$$\cos\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1+\cos\theta}{2}}$$

$$\tan\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$$

LAW OF COSINES

$$a^2 = b^2 + c^2 - 2bc\cos\alpha$$

$$b^2 = a^2 + c^2 - 2ac\cos\beta$$

$$c^2 = a^2 + b^2 - 2ab\cos\gamma$$

PRODUCT TO SUM IDENTITIES

$$\sin\alpha\sin\beta = \frac{1}{2}[\cos(\alpha-\beta) - \cos(\alpha+\beta)]$$

$$\cos\alpha\cos\beta = \frac{1}{2}[\cos(\alpha-\beta) + \cos(\alpha+\beta)]$$

$$\sin\alpha\cos\beta = \frac{1}{2}[\sin(\alpha+\beta) + \sin(\alpha-\beta)]$$

$$\cos\alpha\sin\beta = \frac{1}{2}[\sin(\alpha+\beta) - \sin(\alpha-\beta)]$$

SUM TO PRODUCT IDENTITIES

$$\sin\alpha + \sin\beta = 2\sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$$

$$\sin\alpha - \sin\beta = 2\cos\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$$

$$\cos\alpha + \cos\beta = 2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$$

$$\cos\alpha - \cos\beta = -2\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$$

LAW OF SINES

$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

LAW OF TANGENTS

$$\frac{a-b}{a+b} = \frac{\tan\left[\frac{1}{2}(\alpha-\beta)\right]}{\tan\left[\frac{1}{2}(\alpha+\beta)\right]}$$

$$\frac{b-c}{b+c} = \frac{\tan\left[\frac{1}{2}(\beta-\gamma)\right]}{\tan\left[\frac{1}{2}(\beta+\gamma)\right]}$$

$$\frac{a-c}{a+c} = \frac{\tan\left[\frac{1}{2}(\alpha-\gamma)\right]}{\tan\left[\frac{1}{2}(\alpha+\gamma)\right]}$$

SUM/DIFFERENCES IDENTITIES

$$\sin(\alpha\pm\beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$$

$$\cos(\alpha\pm\beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$$

$$\tan(\alpha\pm\beta) = \frac{\tan\alpha \pm \tan\beta}{1 \mp \tan\alpha\tan\beta}$$

MOLLWEIDE'S FORMULA

$$\frac{a+b}{c} = \frac{\cos\left[\frac{1}{2}(\alpha-\beta)\right]}{\sin\left(\frac{1}{2}\gamma\right)}$$

COFUNCTION IDENTITIES

$$\sin\left(\frac{\pi}{2}-\theta\right) = \cos\theta$$

$$\csc\left(\frac{\pi}{2}-\theta\right) = \sec\theta$$

$$\tan\left(\frac{\pi}{2}-\theta\right) = \cot\theta$$

$$\cos\left(\frac{\pi}{2}-\theta\right) = \sin\theta$$

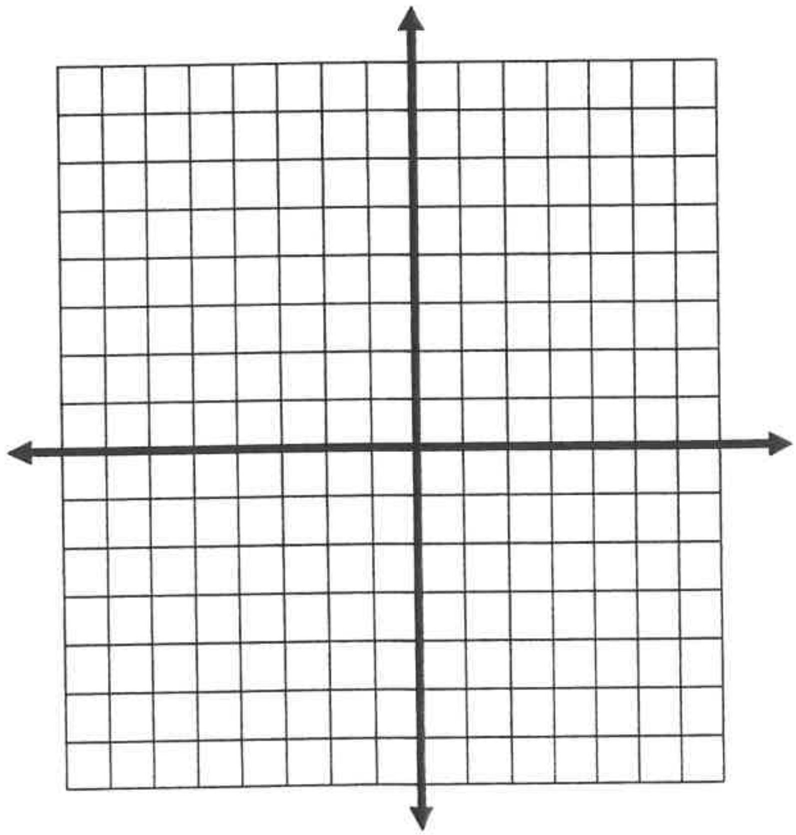
$$\sec\left(\frac{\pi}{2}-\theta\right) = \csc\theta$$

Worksheet Piecewise Functions
Algebra 2

Name:___________________________________

Part I. Carefully graph each of the following. Identify whether or not he graph is a function. Then, evaluate the graph at any specified domain value. You may use your calculators to help you graph, but you must sketch it carefully on the grid!

1. $f(x) = \begin{cases} x+5 & x < -2 \\ x^2 + 2x + 3 & x \geq -2 \end{cases}$



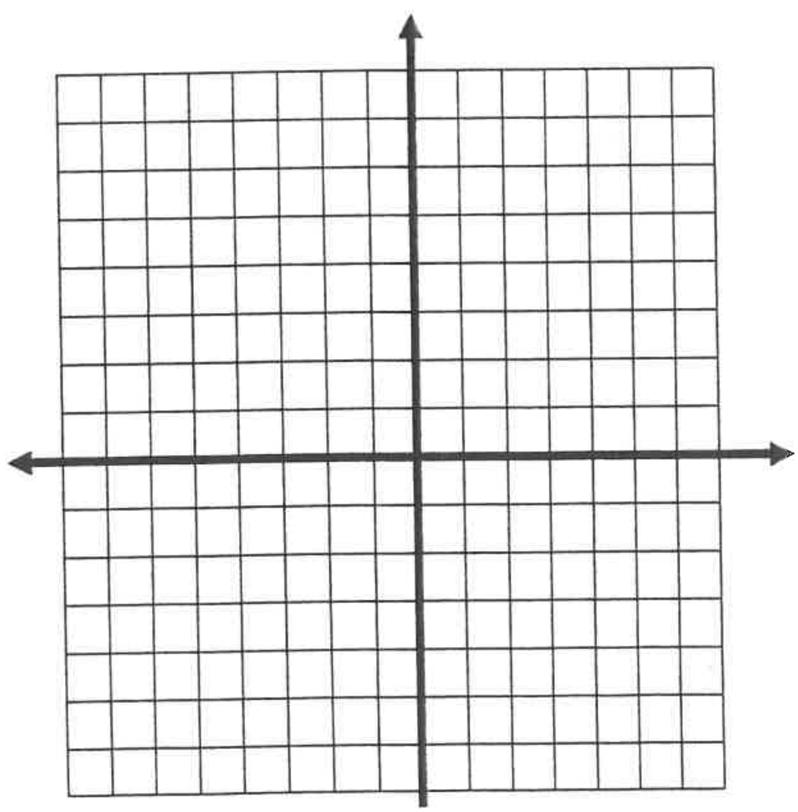
Function? Yes or No

$f(3) =$

$f(-4) =$

$f(-2) =$

2. $f(x) = \begin{cases} 2x+1 & x \geq 1 \\ x^2 + 3 & x < 1 \end{cases}$



Function? Yes or No

$f(-2) =$

$f(6) =$

$f(1) =$

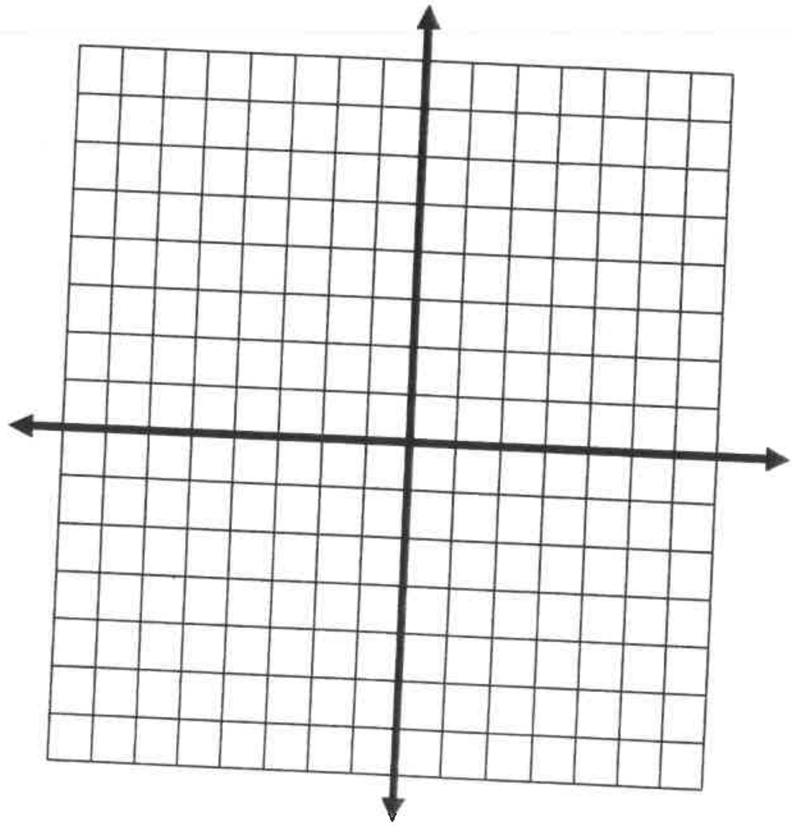
3. $f(x)=\begin{cases}-2x+1 & x\le 2\\ 5x-4 & x>2\end{cases}$

Function? Yes or No

$f(-4)=$

$f(8)=$

$f(2)=$



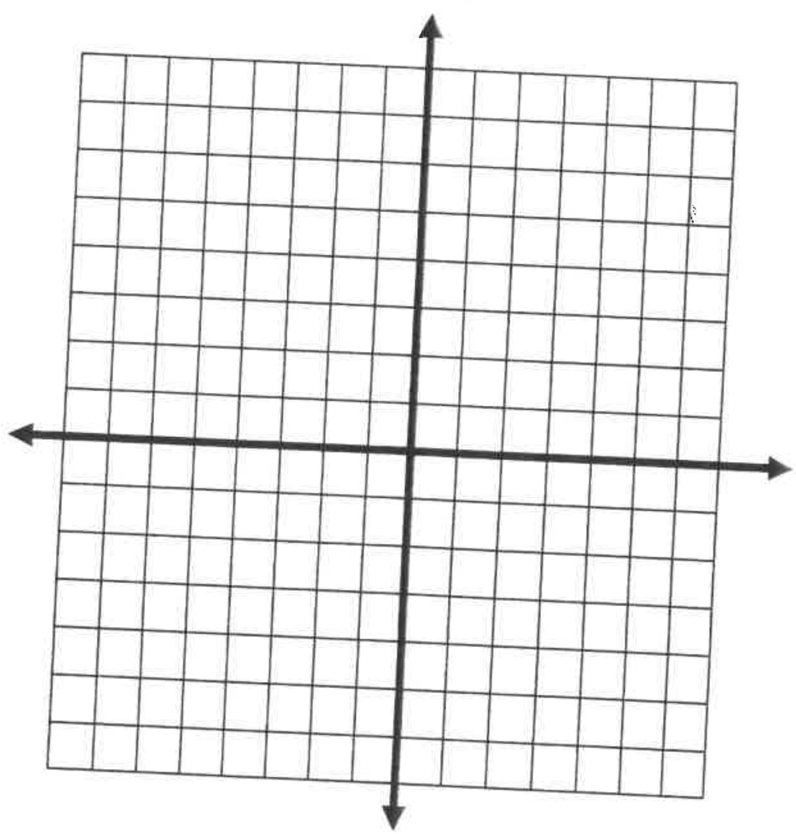
4. $f(x)=\begin{cases}x^2-1 & x\le 0\\ 2x-1 & 0<x\le 5\\ 3 & x>5\end{cases}$

Function? Yes or No

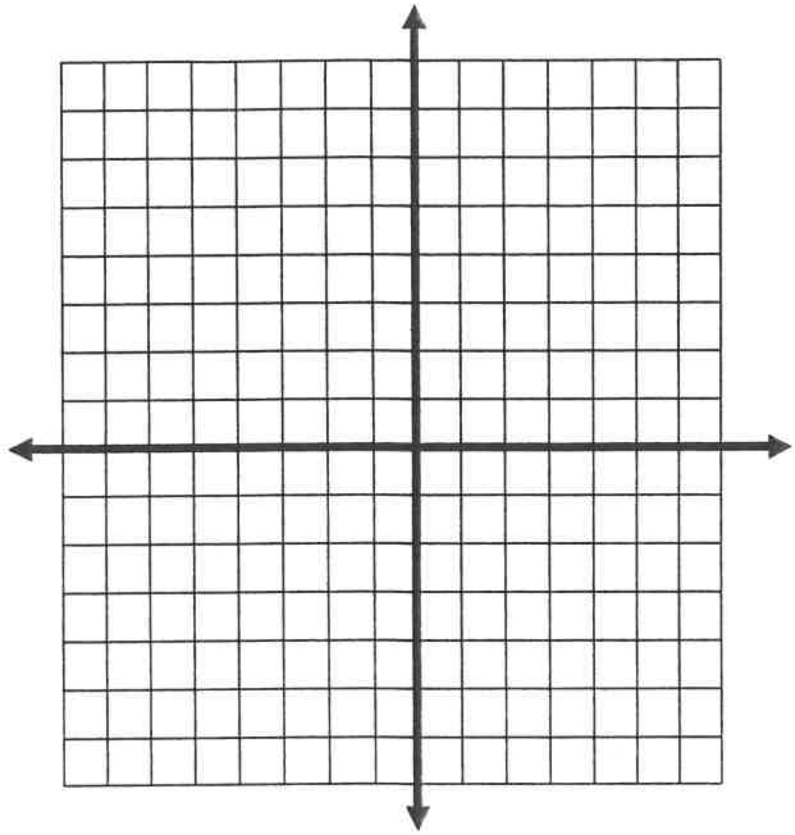
$f(-2)=$

$f(0)=$

$f(5)=$



5. $f(x)=\begin{cases}x^2 & x\le 0\\ -x^2+4 & x>0\end{cases}$



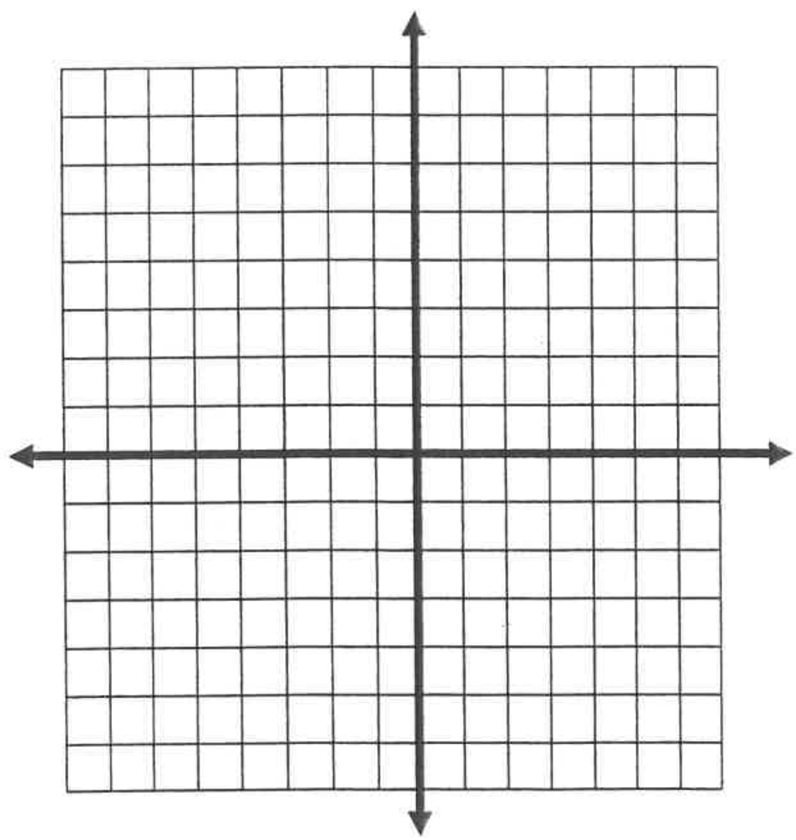
Function? Yes or No

$f(-4)=$

$f(0)=$

$f(3)=$

6. $f(x)=\begin{cases}5 & x\le -3\\ -2x-3 & x>-3\end{cases}$



Function? Yes or No

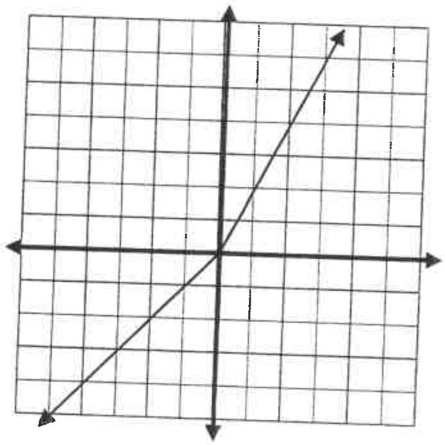
$f(-4)=$

$f(0)=$

$f(3)=$

Part II. Write equations for the piecewise functions whose graphs are shown below. Assume that the units are 1 for every tic marc.

7.



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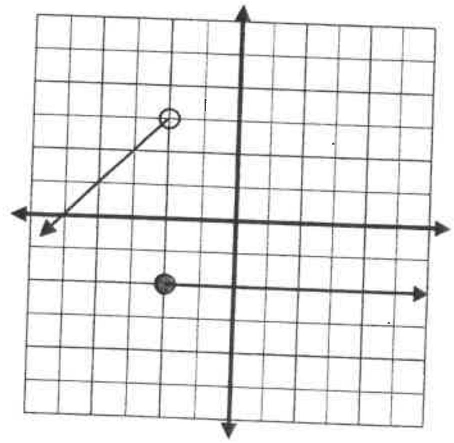

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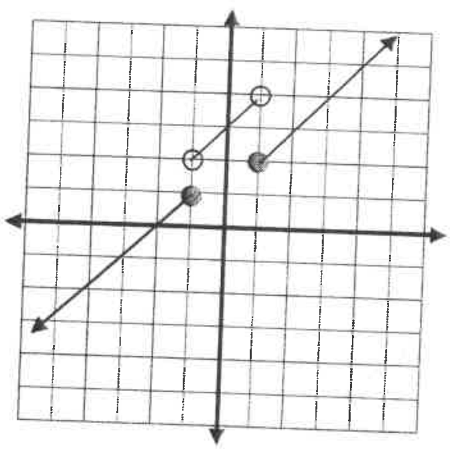
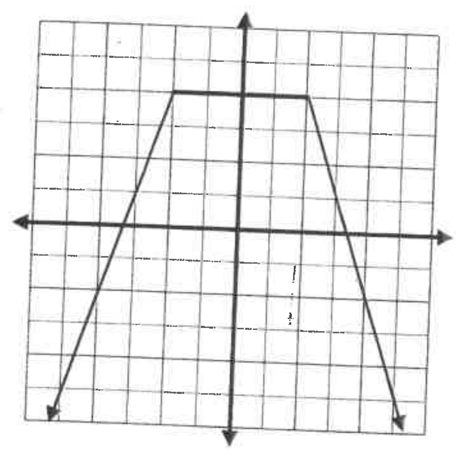


10.



11.