

Unit 1 – Pre-Calculus Assignments

Revised Homework Packet COVID19 – Fall 2020

Essential question: *What pre-calculus concepts are necessary for success in AP Calculus?*

Day	Topic	Assignment
Day 1	EQ: How can we write the equation of functions that are made from known graphs? Take Notes Keeper 1.1 – Equations of Lines, Piecewise and Transformations	- Read syllabus - Show Parents Parent Letter - Read Keeper (Notes) Requirements - Take Notes – Keeper 1.1 Assignment(s): - Lines, Piecewise Functions, and Transformations Worksheet
Day 2	EQ: How do I determine the domain of functions? How do I transform e and ln graphs? Take Notes Keeper 1.2 – Domain Rules and e ln Transformations	Take Notes – Keeper 1.2 Assignment(s): - Domain and Range, e-ln transformation Worksheet
Day 3	EQ: What trigonometry do I need to know? Take Notes Keeper 1.3 – Trig, Inverse Trig, and Solving Trig Equations	Take Notes – Keeper 1.3 Assignment(s): - Inverse Trig and Solving Trig Equations Worksheet
Day 4	EQ: How do I put two functions together Take Notes Keeper 1.4 – Composition, Exponentials and Logarithms	Take Notes – Keeper 1.4 Assignment(s): - Exponentials and Logarithms Worksheet - Composition of Functions Worksheet
Day 5	EQ: How do I solve inequalities? How do I find inverses? Take Notes Keeper 1.5 – Solving Inequalities and Absolute Value	Take Notes – Keeper 1.5 Assignment(s): - Inequalities Worksheet - Absolute Value and Piecewise Worksheet

*****You must show all work and your work must be neat and organized. Sloppy work and unorganized work WILL NOT be accepted!!**

Equations of Lines, Piecewise Functions, and Transformations

Equations of Lines

- Write the slope-intercept form of the equation:
 $11x - 8y = -48$
- Write the standard form of the equation of the line through the given point with the given slope: $(3,5), m = \frac{5}{3}$
- Write the equation of the line described:
through $(4,2)$, parallel to $y = -5x + 2$
- Write the equation of the line described:
through $(-2,4)$, perpendicular to $y = -\frac{5}{2}x + 5$

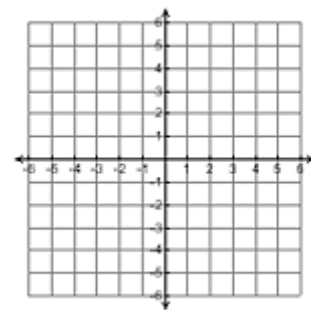
Piecewise functions

5. $f(x) = \begin{cases} x^2 + 2, & x \leq 1 \\ 2x^2 + 2, & x > 1 \end{cases}$

Find:

$f(-2)$	$f(0)$
$f(1)$	$f(s^2 + 2)$

Domain:
Range:



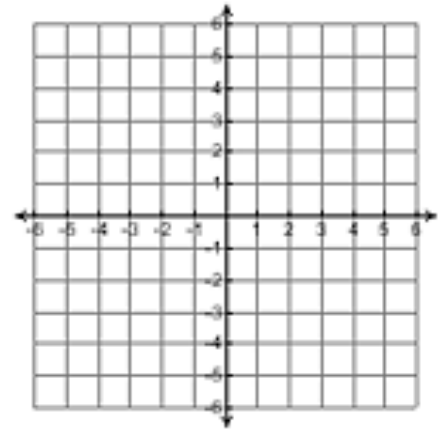
6. $f(x) = \begin{cases} 1, & x < 0 \\ \sqrt{x}, & x \geq 0 \end{cases}$

Domain:

Range:

Find:

$f(-2)$	$f(0)$
$f(1)$	$f(s^2)$



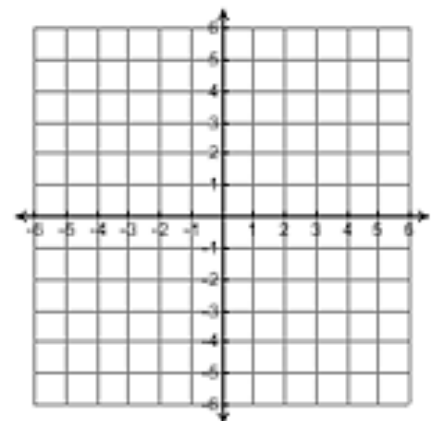
7. $f(x) = \begin{cases} \frac{2}{x^2-4x+5}, & x \leq 2 \\ x^3 - 6x^2 + 12x - 10, & x > 2 \end{cases}$

Domain:

Range:

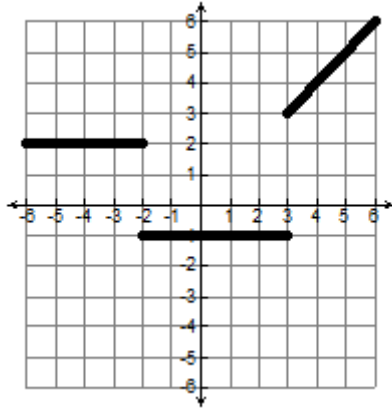
Find:

$f(-2)$	$f(0)$
$f(1)$	$f(2)$

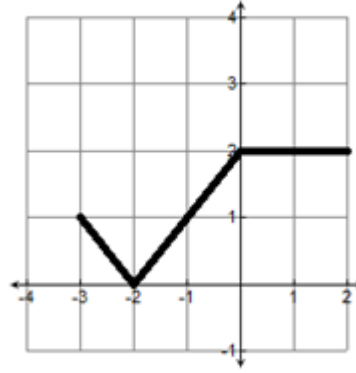


Find the formula for the following:

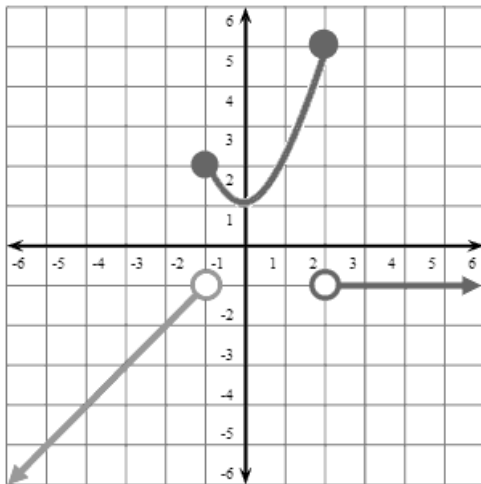
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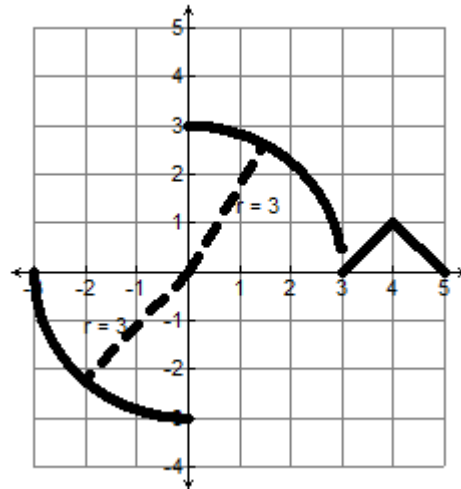
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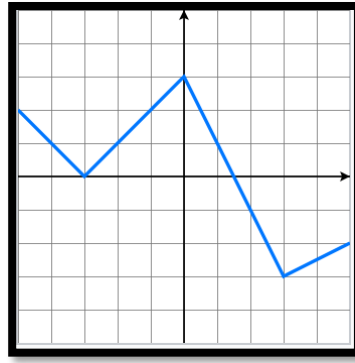
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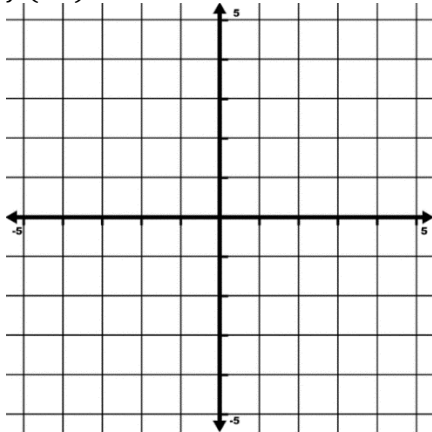
11.



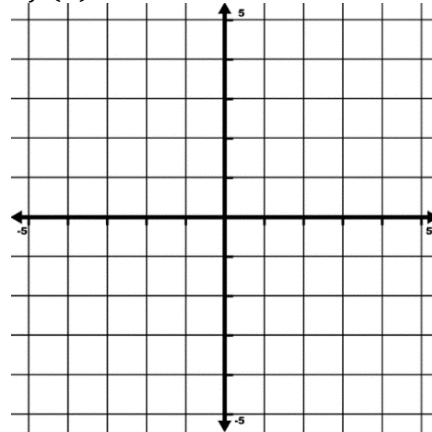
Draw a graph of each transformation. Let $f(x)$ be the function below. Label the critical points. Finally write a description of the transformation.



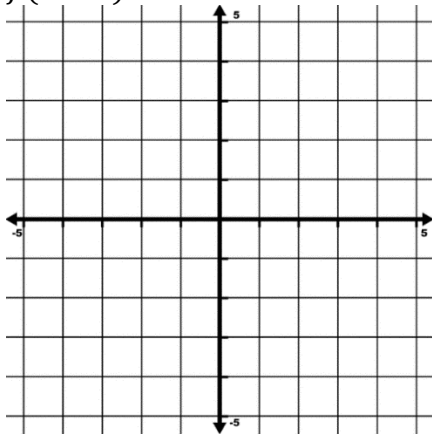
12. $f(2x)$



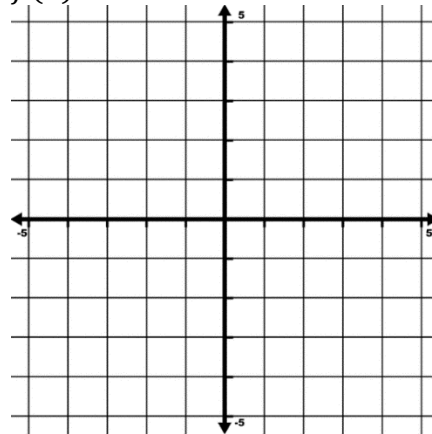
13. $2f(x)$



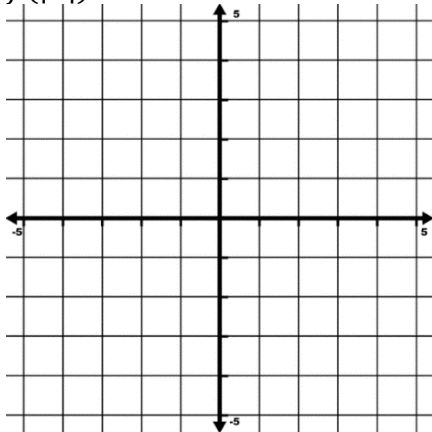
14. $f(x + 2)$



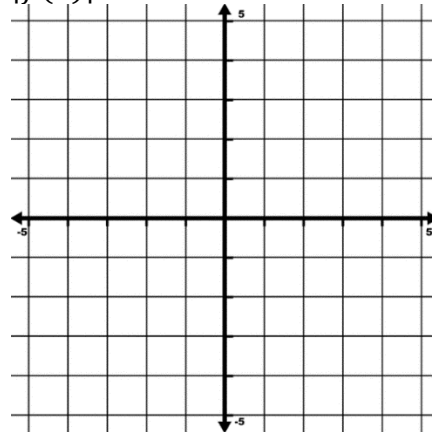
15. $f(x) - 2$



16. $f(|x|)$



17. $|f(x)|$



Domain and e/\ln Transformations

Find the domain of the following. Show your work.

1. $f(x) = \frac{3x-5}{x+1}$

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

3. $f(x) = \ln(x - 7)$

4. $f(x) = \ln\left(\frac{x}{x-1}\right)$

5. $f(x) = \sqrt[3]{3x + 2}$

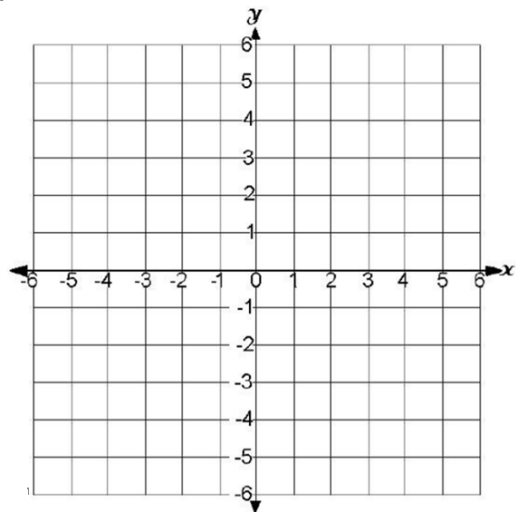
6. $f(x) = \frac{x+1}{x^2+5x+4}$

7. $f(x) = \ln\left(\frac{x+1}{x-3}\right)$

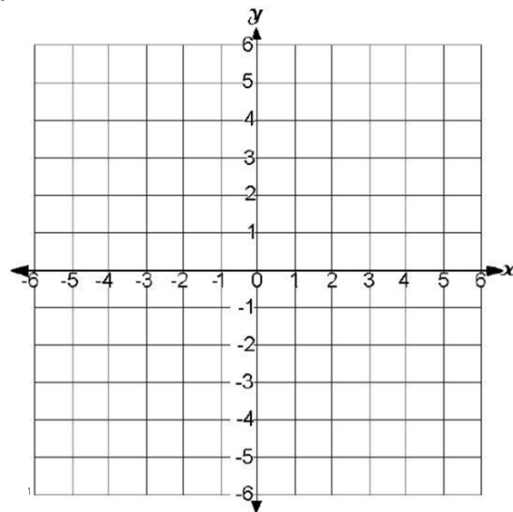
8. $f(x) = \sqrt[4]{x^2 - 8x - 33}$

Graph the Following and describe the transformations:

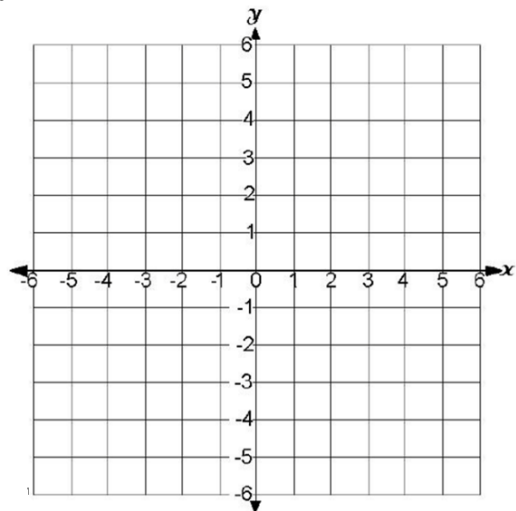
9. $y = e^x$



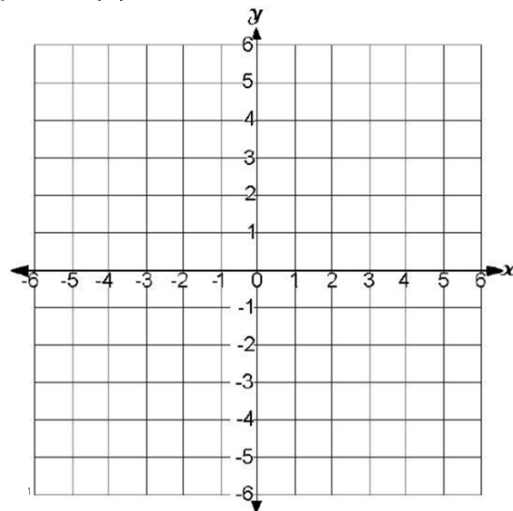
10. $y = 2(e)^x$



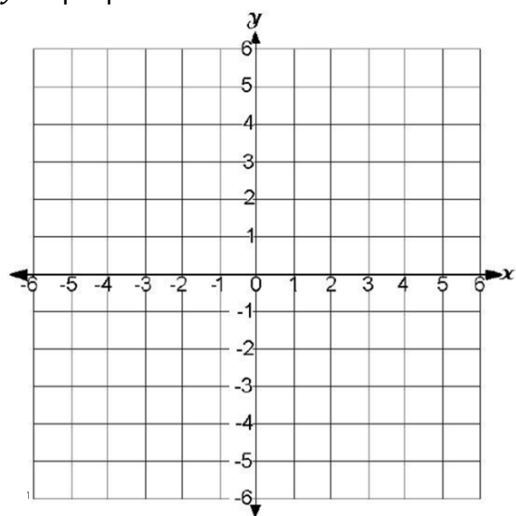
11. $y = e^{x+1}$



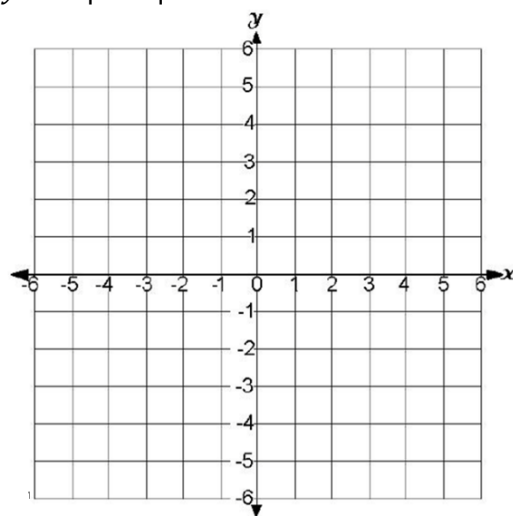
12. $y = \ln(x) - 2$



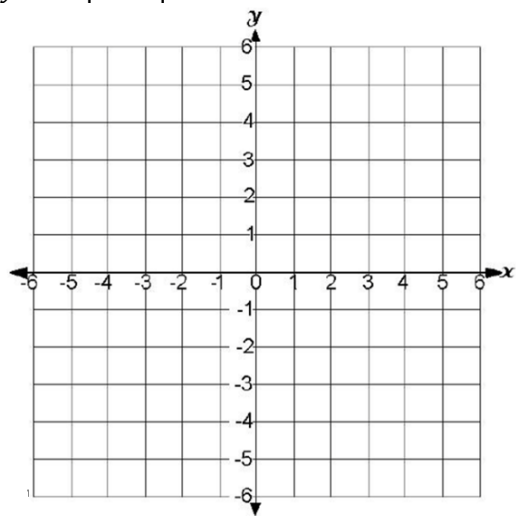
13. $y = |e^x|$



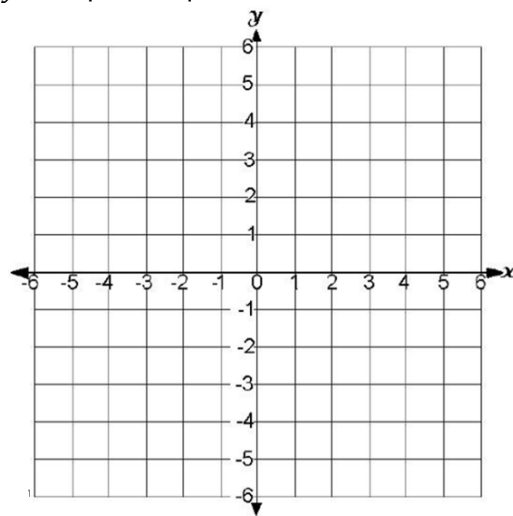
14. $y = -|\ln x|$



15. $y = -|e^{x+2}|$



16. $y = -|e^x - 3| + 2$



Inverse Trig and Solving Trig Equations

Evaluate each expression.

1. $\arcsin\left(\frac{\sqrt{3}}{2}\right)$	2. $\arccos(-1)$	3. $\tan^{-1}(-1)$
4. $\sin^{-1}(-1)$	5. $\arcsin\left(-\frac{1}{2}\right)$	6. $\arctan(-\sqrt{3})$
7. $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$	8. $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$	9. $\tan^{-1}(0)$
10. $\arcsin\left(-\frac{\sqrt{3}}{2}\right)$	11. $\cos^{-1}\left(-\frac{1}{2}\right)$	12. $\arccos\left(-\frac{\sqrt{3}}{2}\right)$
13. $\sin^{-1}\left(\sin\frac{3\pi}{2}\right)$	14. $\tan^{-1}\left(\sin\left(-\frac{\pi}{2}\right)\right)$	15. $\cos^{-1}\left(\sin\left(-\frac{\pi}{6}\right)\right)$
16. $\cos\left(\sin^{-1}\frac{12}{13}\right)$	17. $\tan\left(\sin^{-1}\left(-\frac{8}{17}\right)\right)$	18. $\sin\left(\cos^{-1}\left(-\frac{4}{5}\right)\right)$
19. $\sin(\cos^{-1} x)$	20. $\sin\left(\cos^{-1}\frac{x}{2}\right)$	21. $\tan(\sin^{-1} 2x)$

Solve for x , where $0 \leq x < 2\pi$

22. $2 \sin x - 1 = 0$

23. $2 \cos x + 1 = 0$

24. $4 \sin x + 2\sqrt{3} = 0$

25. $2 \tan x + \sqrt{3} = -\tan x$

26. $2 \cos^2 x = 3 \cos x + 2$

27. $2 \cos^2 x = \sin x + 1$

28. $\sin 2x = \sin x$

29. $\tan 2x = -\sqrt{3}$

30. $\sin 2x = -1$

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

32. $\tan 3x = 1$

33. $2 \sin(2x) + 1 = 0$

Exponentials and Logarithms

Find the value of the following without using your calculator.

1. $e^{\ln(5)} + e^x e^{-x}$

2. $\ln\left(\frac{1}{e}\right) - \ln 1 + e^{3 \ln 2}$

3. $e^{-2 \ln 3 + 3 \ln 2}$

Express each of the following as the logarithm of a single expression.

4. $\frac{1}{3} \ln x + 2 \ln(3x - 5)$

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

6. $2 \ln x + 3 \ln(1 + x) - 4 \ln(2 + x)$

7. $\frac{1}{2} \ln x - 2 \ln(x^2 + x + 1)$

Use the properties of logarithms to express the following as an algebraic expression involving **log x**, **log y**, and/or **log z** (or **ln ***).

8. $\log \sqrt{16x^8 y^4 z^2}$

9. $\ln \left(\frac{81\sqrt{x}}{\sqrt{yz^3}} \right)$

10. $\ln \left(\frac{\sqrt[3]{x}}{10\sqrt{yz}} \right)$

11. $\ln \left(\frac{\sqrt[4]{x^3 y^7}}{z^8} \right)$

Solve for x.

12. $3^{x-1} = 81$

13. $-14 + 3e^x = 11$

14. $2e^{2x} - 5e^x - 3 = 0$

15. $25(1 - e^x) = 12$

16. $4^{3x-3} \cdot 4^{2-2x} = 16^{-x}$

17. $-5e^{-x} + 9 = 6$

18. $5A = 2Ae^{x+k}$

19. $2e^{bx} = e \cdot 3^{bx}$

20. $7(3^x) - 10x(3^x) + 3x^2(3^x) = 0$

21. $\ln(x) - \ln(3) = 4$

22. $\ln(x+2)^2 = 6$

23. $\log_5(\log_5(x+10)) = 0$

24. $4^{\log_4(x+2)} = 2x$

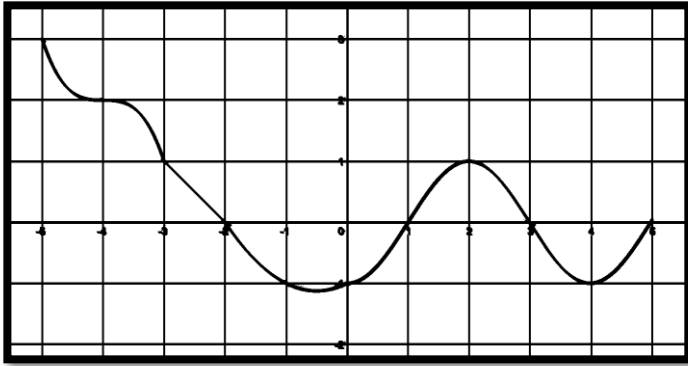
25. $2\log_4 x - \log_4(x-1) = 1$

26. $\ln x - \ln(6) = 2\ln(4)$

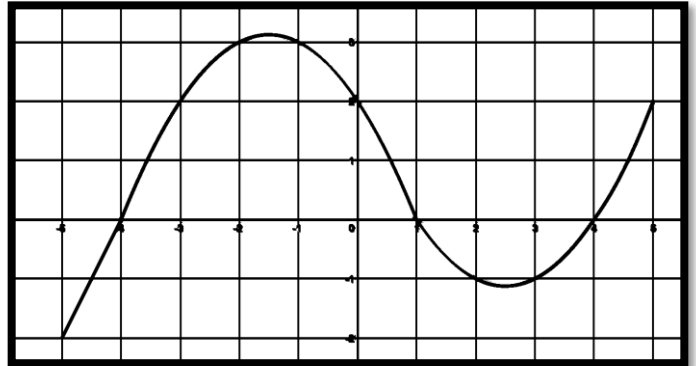
Composition of Functions

Given the following functions $f(x)$ and $g(x)$, find the following.

Graph of f



Graph of g



1. $f(g(-2))$
2. $f(g(2))$
3. $g(f(-1))$
4. $f(f(5))$
5. $g(g(-2))$

Given the tables for functions f and g , find the following.

x	$f(x)$
-1	2
0	4
1	3
2	0
3	1
4	-1

x	$g(x)$
-1	3
0	4
1	2
2	6
3	2
4	-1

6. $f(g(3))$
7. $g(f(2))$
8. $f(f(4))$
9. $g(g(4))$

Given the tables for functions f and g , find the following.

x	$f(x)$
-2	0
0	1
2	-1
4	2

x	$g(x)$
-1	-2
0	2
1	3
2	1

10. $f(f(-2))$
11. $f(g(0))$
12. $g(f(1))$

Let $f(x) = 2x - 3$, $g(x) = e^x$, and $h(x) = \ln x$. Find a formula for each function.

13. $f(f(x))$ 14. $f(g(x))$ 15. $g(h(x))$ 16. $h(g(x))$

Let $f(x) = x^3$, $g(x) = 5x + 1$, and $h(x) = 2^x$, find the following.

17.. $f(g(x))$ 18. $h(f(x))$ 19. $h(g(x))$

20. $g(h(x))$ 21. $g(f(x))$ 22. $f(g(h(x)))$

In the composition of functions $f(g(x))$, g is known as the inner function and f is known as the outer function. For each problem below, specify the inner and outer function.

23.. $y = (7x - 3)^2$ 24. $y = \ln(x^2 + 4)$ 25. $y = 2^{3x-5}$

26. $y = e^{\ln x}$ 27. $y = \sqrt{x}$ 28. $y = (\ln x)^2 + 1$

29. $y = (x^2 - 4)^3$ 30. $y = \frac{2}{(x-7)^2}$ 31. $y = \sqrt[5]{x+3}$

Inequalities

1. $x^2 - 6x - 30 > -3$

2. $x^2 + 5x + 6 < 20$

3. $(x - 4)^2 > 4$

4. $-4x^2 - 13x - 6 \leq 0$

5. $2x^2 - 10x \leq 2x - 16$

6. $7x^2 - 12x - 45 \geq 0$

7. $x^2 + 5x + 8 < 0$

8. $x^2 + 5x + 8 \geq 0$

9. $x^2 - 10x + 25 > 0$

10. $x^2 - 10x + 25 \leq 0$

11. $2x^2 + 16 \leq x^2 + 8x$

12. $-x^2 \geq 4x + 4$

$$13. 2x^2 \leq -x - 4$$

$$14. 2x^2 + 8x \geq 4x - 8$$

$$15. x^2(5 - x)(x + 3) < 0$$

$$16. x^4 < 4x^2$$

$$17. \sqrt{3x + 4} \geq 2$$

$$18. \sqrt{3x + 4} \leq 2$$

$$19. -\sqrt{x} \geq 2$$

$$20. \sqrt{2x + 1} - 3 < 0$$

$$21. \frac{x^2 - 11x + 28}{x + 3} \geq 0$$

$$22. \frac{x^2 - 10x + 24}{x + 5} \geq 0$$

$$23. 32^{5x+2} \geq 16^{5x}$$

$$24. 2^{4x-5} > \left(\frac{1}{2}\right)^{x-5}$$

$$25. \log_4 x \leq \frac{3}{2}$$

$$26. \log_5 x - 7 \geq -6$$

$$27. 8 \ln x \geq 1$$

$$28. -2 \log_7 x + 9 > 11$$

$$29. \log_5(x - 4) + 6 \leq 8$$

$$30. |x| \leq 2$$

$$31. |x + 3| > 4$$

$$32. |x + 3| < 6$$

$$33. 3|2x - 4| \geq -9$$

$$34. 2|x - 9| + 6 > 6$$

Absolute Value & Piecewise Functions

Solve the absolute value equation/inequality.

1. $|3x + 12| + 7 = 7$

2. $|3x - 7| + 7 = 2$

3. $|3x - 7| + 7 = 9$

4. $|x + 5| = |2x - 1|$

5. $|x - 4| \geq 0$

6. $|2x - 1| + 4 < 4$

7. $-3 + |x + 1| \leq -3$

8. $|3x + 4| + 5 \leq 3$

9. $2|x - 1| - 4 \geq 2$

10. $|x - 6| + 6 \geq -4$

11. $|2 - x| < 8$

12. $3|4x - 1| \leq 9$

Rewrite as a piecewise function.

13. $f(x) = |x - 2|$

14. $f(x) = \left| \frac{x-3}{x+1} \right|$

15. $f(x) = |x^2 - 3x - 4|$

16. $f(x) = |x - 4|$

17. $f(x) = |x^2 - 5x - 6|$

18. $f(x) = \left| \frac{2x+1}{4-x} \right|$