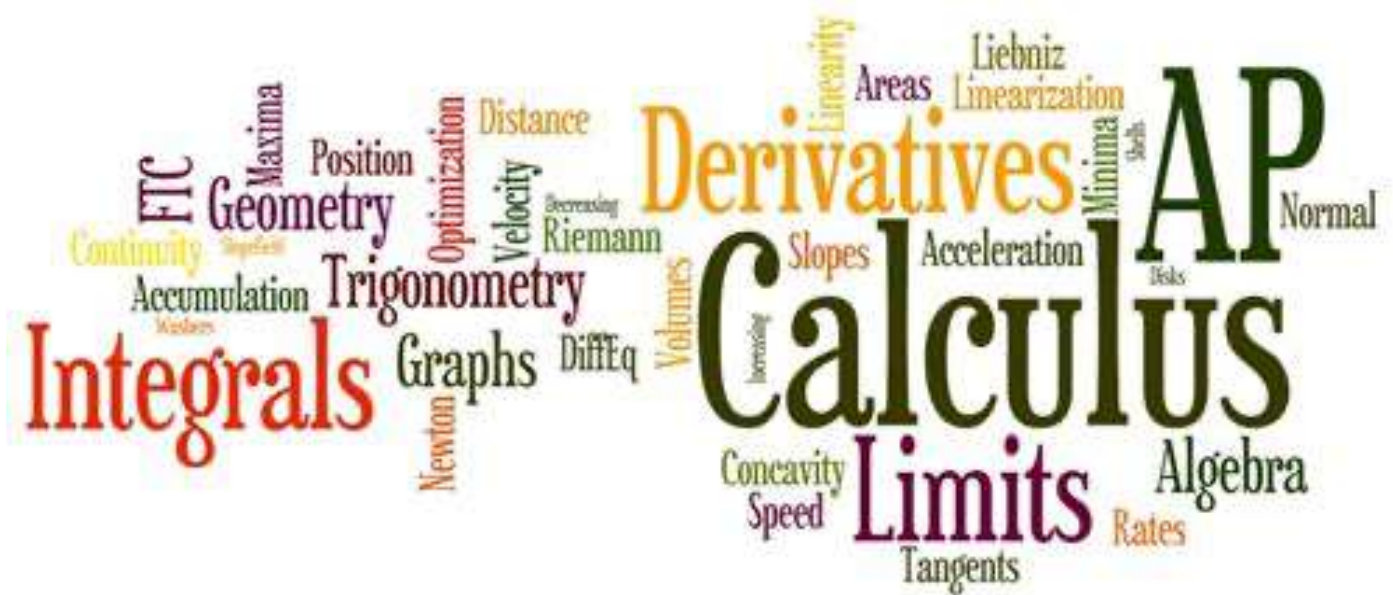


AP Calculus AB

Summer Assignment



Welcome to **AP Calculus AB**! This review assignment is designed to refresh your Algebra I, Algebra II, Pre-Calculus, and Analytic Geometry skills. It includes information that was taught in these previous courses and will be used throughout the upcoming school year. As you prepare, you may need to seek help by accessing the suggested resources or links provided.

NOTE: Look out for a "Trig for Calculus Boot Camp" CANVAS course on your dashboard. Through it, you will be invited to participate in an on-campus class this summer that will help you solidify prerequisites needed for your class next school year. Stay tuned for registration information.

IMPORTANT: Read this page first...

INSTRUCTIONS

1. Complete all sections and problems in this packet on your own.
2. Make sure to show your work to earn credit.
3. Calculators are permitted.

PACING

You should pace yourself to work on this assignment at least a few hours a week leading up to the start of school in September. If you complete the packet at the end of June or early in July, it will not be very helpful in preparation for the start of school. Also, it will not be helpful if you try to complete the entire packet a night or two before school starts. Pace yourself by setting a calendar reminder and scheduling blocks of time to focus on this assignment as you prepare to return to school in September.

GRADING

- On the first day of school, your math teacher will check for full completion of this Summer Assignment and the supporting work for your responses (no work = no credit). This part will be weighted at 50% - this is the grade that represents your effort and following of directions.
- Your teacher will then review the assignment and provide remediation as needed.
- Upon completion of your teacher's review, you will be given an assessment (a "test") based on the topics covered in this assignment. This assessment will be weighted at 50% - this is the grade that represents your mastery of the skills.
- The two weighted scores combined will count as one project grade for the 1st trimester.
- Acceptance of late assignments will be limited and subject to point deductions.

We are looking forward to meeting you in September.

Go Bulldogs!



RESOURCES & REFERENCE MATERIALS

<https://www.khanacademy.org/math/precalculus>

<https://www.khanacademy.org/math/algebra2>

<https://www.khanacademy.org/math/ap-calculus-ab/ab-limits-new/ap-ab-about/a/ap-calc-prerequisites>

<https://quizlet.com/>

<https://academy.hslda.org/files/HSLDA-AP-Calculus-AB-Readiness-Test.pdf>

<https://www.cliffsnotes.com/study-guides/algebra/algebra-ii>

Part 1: Solving Equations

Solve for x .

1. $2(3^{4x-5}) + 4 = 11$

6. $4\ln e = 4$

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

7. $x^4 - 6x^2 + 8 = 0$

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

8. $2 \sin 3x - 1 = 0$

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

9. $\ln(x-3) + \ln(x-2) = \ln(2x+24)$

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

10. $2\cos^2 x - \sin x = 1$ and $0 \leq x \leq 2\pi$

Part 2: Equation of a Line

Find equation of the lines passing through (2, 4) and having the following characteristics.

11. Slope of $-\frac{2}{3}$.

12. Perpendicular to the line $x + y = 0$.

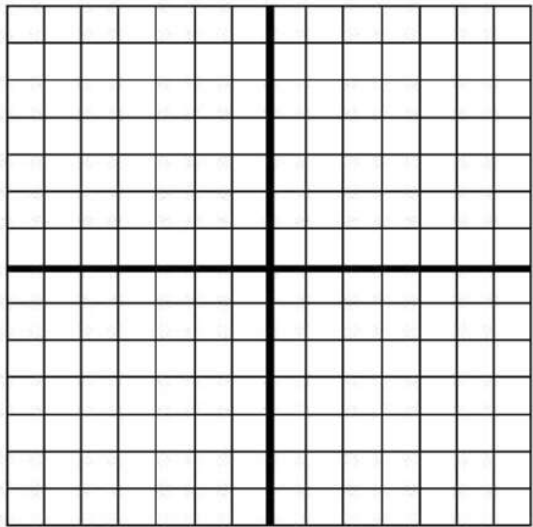
13. Passing through the point (6,1).

14. Parallel to the x-axis.

Part 3: Transformations

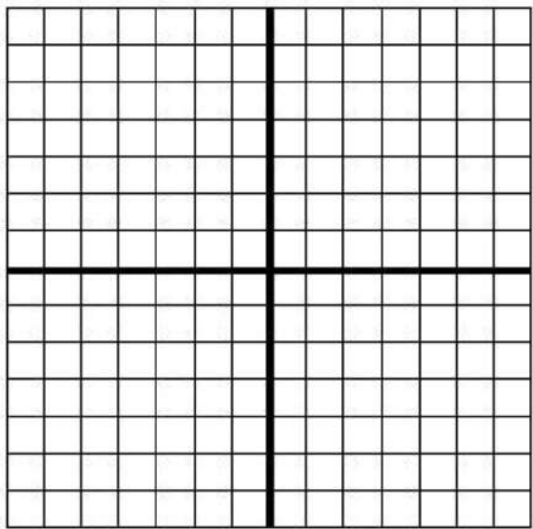
Sketch the following graphs.

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



- a.) $H(x) + 3$ b.) $H(x - 1)$
c.) $-2H(x)$ d.) $-H(x - 1) + 3$

16. The function of $g(x)$ is defined: $g(x) = \begin{cases} \sqrt{x}, & x \geq 0 \\ x, & x < 0 \end{cases}$



- a.) $g(x) - 2$ b.) $g(x - 2)$
c.) $-g(x)$ d.) $-g(x - 2) + 2$

Part 4: Operations with Functions

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

$$f(x) = 1 - x^2 \qquad g(x) = 2x + 1$$

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

18. $f(x)g(x)$

19. $f(g(1))$

20. $g(f(5))$

21. $f(g(x))$

22. $g(f(x))$

23. $g(g(x))$

Part 5: Tangent Lines

24. Consider the circle $x^2 + y^2 - 6x - 8y = 0$

a.) Find the center and the radius of the circle (change into $(x - a)^2 + (y - b)^2 = r^2$ where (a, b) are the coordinates of the center and r is the radius.

b.) Find an equation of the tangent line to the circle at the point $(0,0)$.

c.) Find an equation of the tangent line to the circle at the point $(6,0)$.

d.) Find the coordinates of the point where the two tangent lines intersect.

Part 6: Odd, Even, and Inverse Functions

Determine whether each function is odd, even, or neither.

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

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

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

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

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

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

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

$$f(x) = \tan(\sec(x))$$

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

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

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

Part 7: Finding Zeroes of a Polynomial Function using Synthetic Division

32. Given the fact that one root of the given polynomial is $x = 2$, find the other zeroes of

$$f(x) = 2x^3 - \frac{11}{3}x^2 - x + \frac{2}{3}.$$

33. If $(x + 5)$ is a factor of $g(x) = x^3 + 9x^2 + 23x + 15$ find the other two factors.

34. Find all zeroes of $f(x) = x^3 - x^2 - 14x + 24$.

35. Find all zeroes of $h(x) = 2x^4 - x^3 - 18x^2 + 9x$.

Part 8: System of Equations

Find where the graphs intersect.

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

$$g(x) = -0.5x + 7$$

38. $f(x) = 6x^4 - 1$

$$g(x) = 3$$

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

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

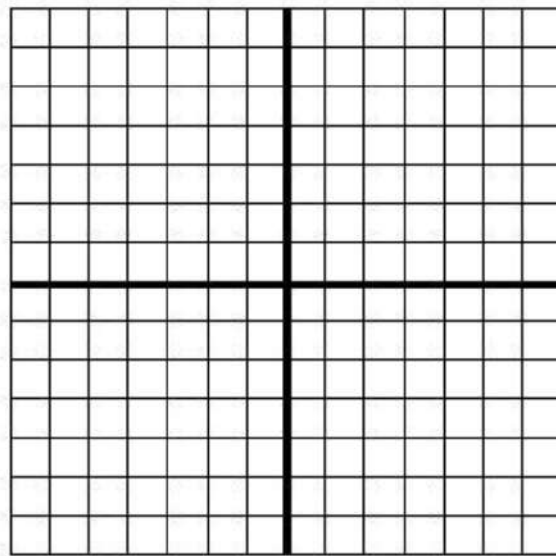
39. $y = -\frac{1}{5}x + \frac{1}{5}$

$$x = y^2 - 6y + 1$$

Part 9: Piecewise Functions

Sketch the graph of $f(x)$ and find the indicated values.

$$40. f(x) = \begin{cases} x - 2, & x < 0 \\ x^2 + 1, & x \geq 0 \end{cases}$$



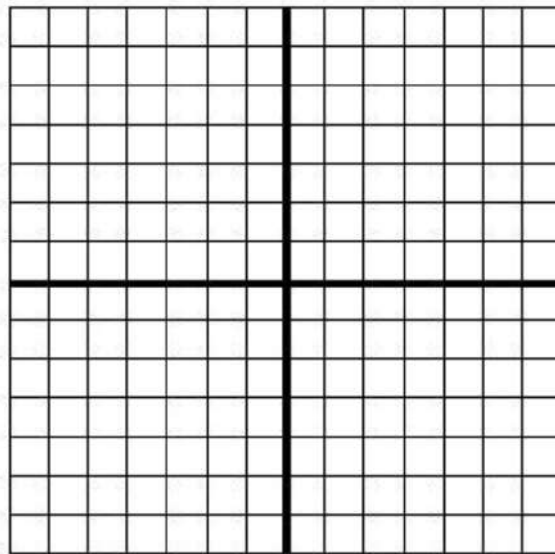
a. $f(-4)$

b. $f(0)$

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

d. $f(f(0))$

$$41. f(x) = \begin{cases} 6 - x, & x \leq 3 \\ \ln x, & x > 3 \end{cases}$$



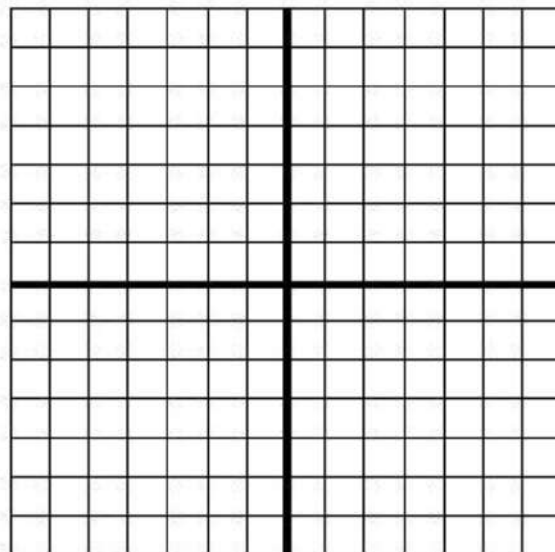
a. $f(3)$

b. $f(5)$

c. $f(f(0))$

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

$$42. f(x) = \begin{cases} \sin x, & x \leq 0 \\ x^3, & x > 0 \end{cases}$$



a. $f(-\pi)$

b. $f(2)$

c. $f\left(f\left(-\frac{3\pi}{2}\right)\right)$

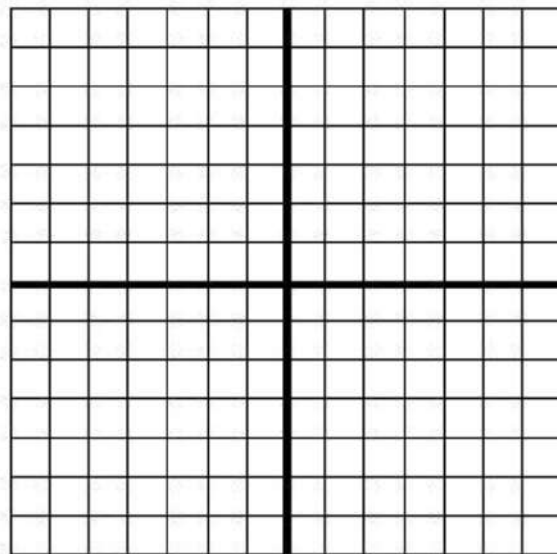
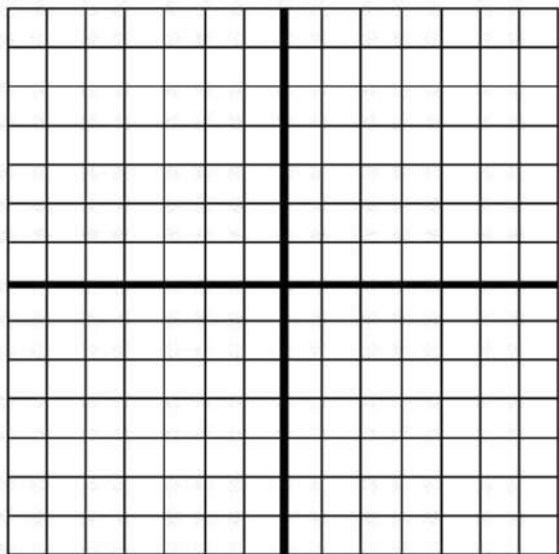
d. $f(f(0))$

Part 10: Function Type

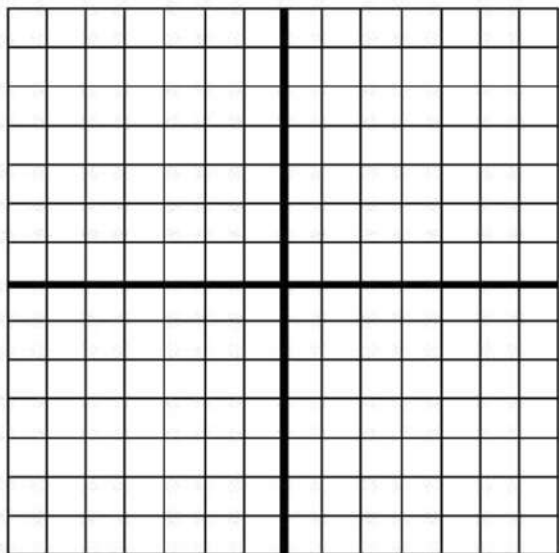
Name the function, find its domain and range, zeroes, and graph it.

43. $4x - 3y = 6$

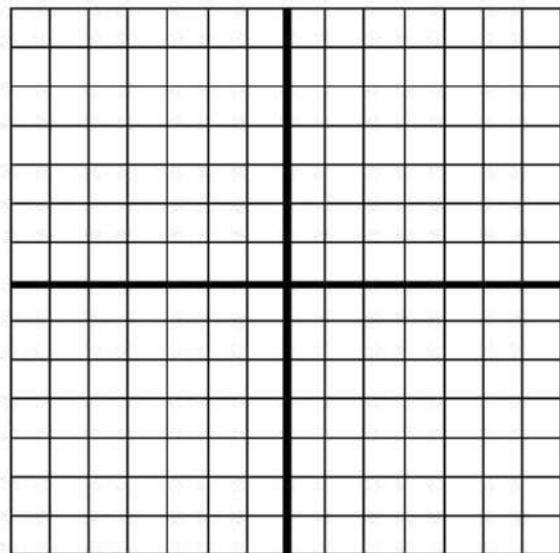
44. $f(x) = x^2 - 2x - 3$



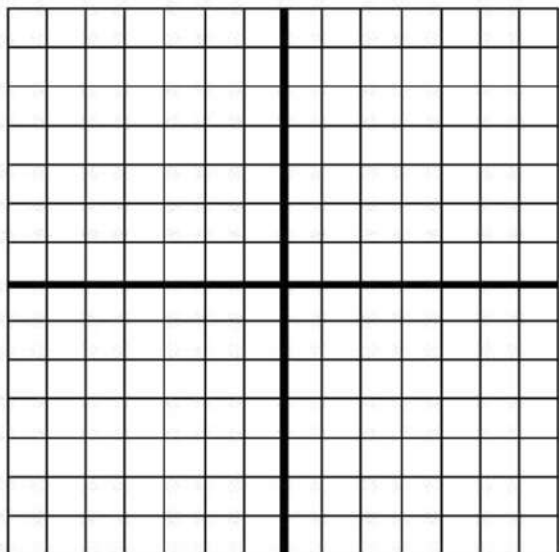
45. $y = x^3 - 8$



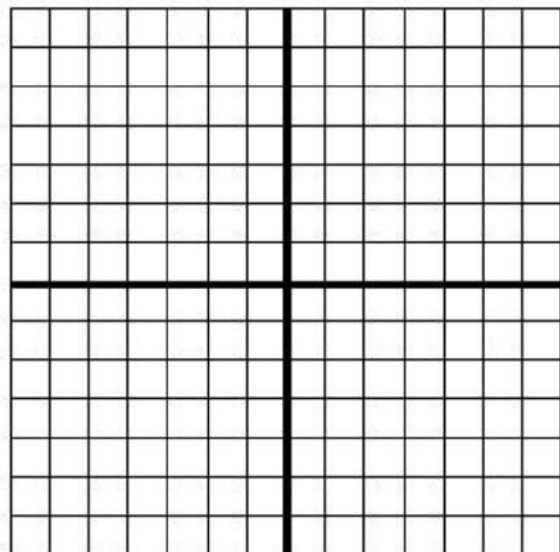
46. $y = 2^x$



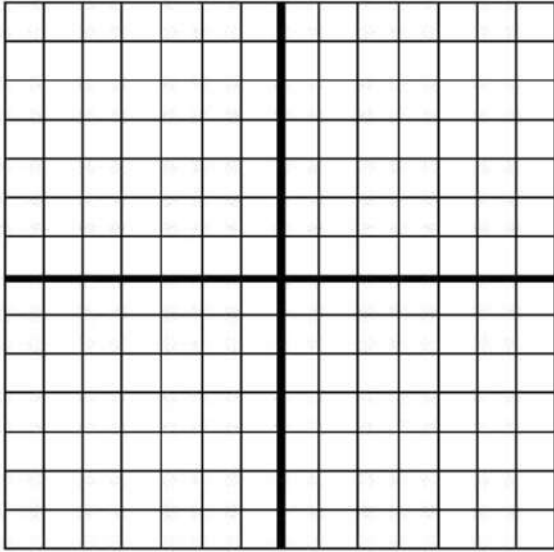
47. $f(x) = \sin x$



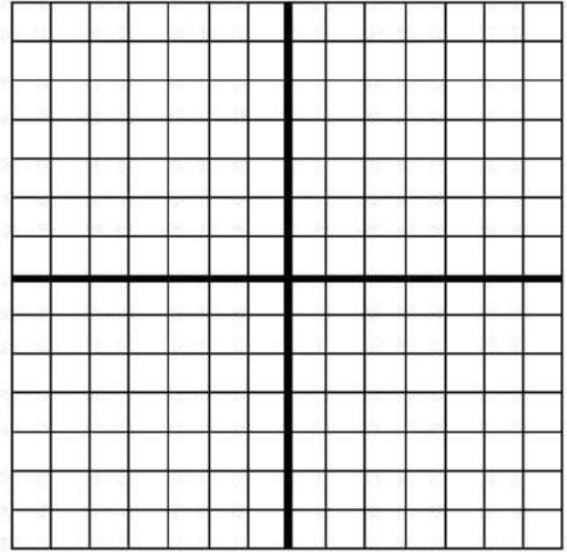
48. $f(x) = \tan x$



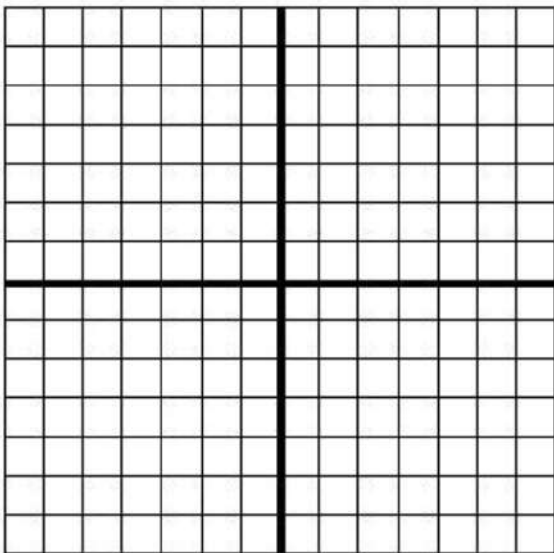
49. $f(x) = \cos x$



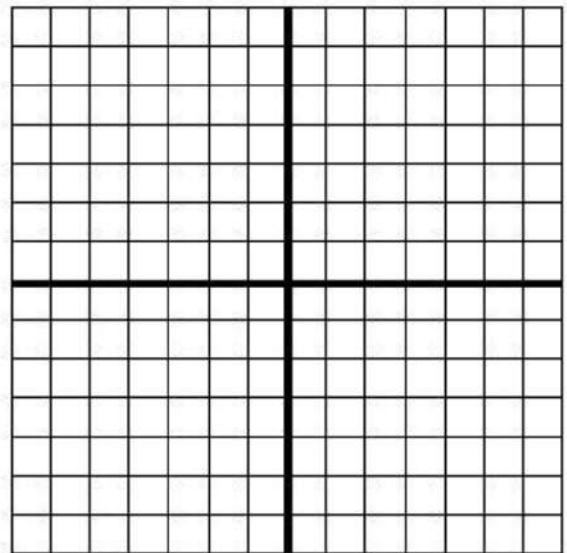
50. $y = \sqrt{x - 3}$



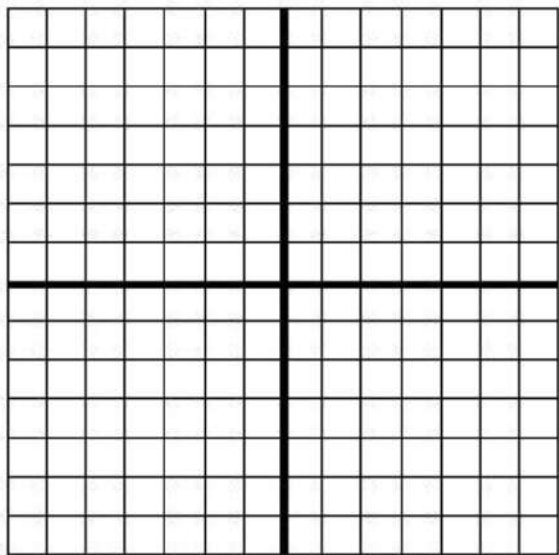
51. $f(x) = \frac{2}{x-3}$



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



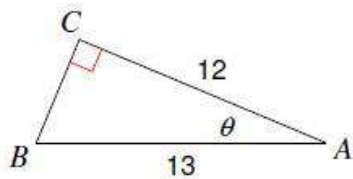
53. $f(x) = \ln x$



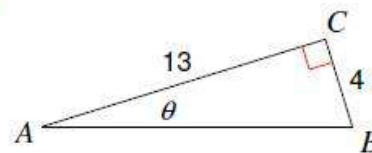
Part 11: Solving Problems involving Trigonometry

54. Triangles: Solve for the missing side and θ .

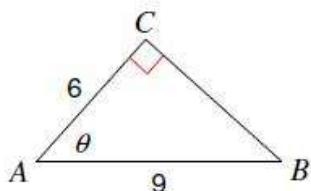
1)



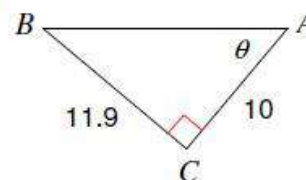
2)



3)



4)



55. Find the equation of a line (in $y = mx + b$ form) through the point $(-2, 5)$ with an angle of inclination of 45° .

56. If $\sin x = \frac{3}{5}$, find $\sin(2x)$.

57. The angle of elevation of the top of a building from point on the ground 40 feet from the foot of the building is 60° . How tall is the building?

Part 12: Trig Identities

Prove that both sides of each equation are equal to each other.

58. $\sin^5 x = (1 - 2\cos^2 x + \cos^4 x) \sin x$

59. $\frac{\cos^2 x}{\sin x} + \sin x = \csc x$

60. $\frac{1}{1-\sin x} + \frac{1}{1+\sin x} = 2\sec^2 x$

61. $\cot x = \frac{1+\cos^2 x}{\sin^2 x}$

Part 13: Unit Circle

Fill in the unit circle, label degrees, and radians ($\cos x$, $\sin x$).

