AP Calculus AB
Course Introduction Sessions

Thursday, August 1st
8:00 am to 10:00 am
Room W218

OR

Friday, August 2nd
8:00 am to 10:00 am
Room W218

- Meet the instructor and receive general course information

- Get help on the summer assignment and know what to expect for the first test

- Receive information on extra help sessions throughout the school year

- Ask any questions you may have about the class

AP CALCULUS AB SUMMER ASSIGNMENT

Solve each of the following problems, **showing all work**. Do **NOT** just write the answer. Be sure all answers are in simplified form. Box in and/or highlight your answers. The assignment is due on the first day of class. The first unit test of the semester will include topics from this assignment following a brief review of these topics.

Write each of the following absolute value equations in piecewise form. Show work leading to your answers. Ex: $f(x) = |3x + 2|$. Determine where the absolute value expression is positive and where it is negative by setting $3x + 2 = 0$ and solving to get $x = \dfrac{-2}{3}$. Since $3x + 2 \geq 0$ for any $x \geq \dfrac{-2}{3}$, the expression remains positive when the absolute value is dropped. Since $3x + 2 < 0$ for any $x < \dfrac{-2}{3}$, the expression becomes negative when the absolute value is dropped. $f(x) = |3x + 2| = \begin{cases} 3x + 2, x \geq \dfrac{-2}{3} \\ -3x - 2, x < \dfrac{-2}{3} \end{cases}$

1. $f(x) = |2x - 5|$

2. $f(x) = |4x^2 - 1|$

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

Find each of the following for $f(x) = x^2 + 3x + 1$ **and** $g(x) = \dfrac{1}{x + 4}$. **Simplify your answers.**

4. $f(g(x))$

5. $f(x + h)$

6. $g^{-1}(x)$

Find each of the following values in exact form

7. $\sin\left(\dfrac{4\pi}{3}\right)$

8. $\cos\left(\dfrac{7\pi}{4}\right)$

9. $\tan\left(\dfrac{7\pi}{6}\right)$

10. $\sin(5\pi)$

11. $\cos\left(\dfrac{-2\pi}{3}\right)$

12. $\csc\left(\dfrac{3\pi}{2}\right)$

13. $\sec\left(\dfrac{2\pi}{3}\right)$

14. $\cot\left(\dfrac{11\pi}{6}\right)$

15. $\csc(\pi)$

Find each of the following for the piecewise function $f(x) = \begin{cases} \sqrt{x}, x \geq 0 \\ 2x + 1, x < 0 \end{cases}$. **Be sure answers are in exact form. Show your work!!**

16. $f(-2)$

17. $f(25)$

18. $f(-9)$

Solve each of the following for *y* in terms of *x*. Show all work.

19. $3xy + 2y = -6x + 1$

20. $3y^2 + 14x = 2x^2$

21. $9x - 3y + 2xy = 7x^2 + 4y$

22. $12x^2 y + 70xy - 3x^3 + 12x = 9y + 13x^2$

Sketch the graph of each function.

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

24. $f(x) = |x+1| + 4$

25. $f(x) = (x-1)^3$

26. $f(x) = -\sqrt{x-5} + 2$

27. $f(x) = 2^x + 3$

28. $f(x) = \dfrac{1}{2}^{(x-2)}$

29. $f(x) = -2(x-1)^2 + 4$

30. $f(x) = 2\sin(\pi x) - 3$

31. $f(x) = -\cos(2x - \pi)$

32. $f(x) = e^x - 2$

33. $f(x) = \ln(x+3)$

34. $f(x) = \tan\left(\dfrac{x}{2}\right) + 1$

Find any asymptotes (vertical, horizontal, or slant) for the following functions and any x-intercepts. Do Not Graph.

35. $f(x) = \dfrac{x}{x^3 - 3}$

36. $f(x) = \dfrac{x^3 + 2x^2 - x - 2}{x^2 + x - 6}$

**Solve each of the following equations for *x*. Use algebra and show your work.
For trigonometric equations, give all exact solutions on the interval $[0, 2\pi)$.**

37. $x^4 + x^2 - 2 = 0$

38. $x^{\frac{1}{2}} + \dfrac{1}{x^{\frac{1}{2}}} - 2 = 0$

39. $15x - \dfrac{4}{x} = 4$

40. $-x^5 + 29x^3 - 100x = 0$

41. $x^{\frac{2}{3}} + 2x^{\frac{1}{3}} - 15 = 0$

42. $4x^2 - x^3 = 0$

43. $-x^3 - 5x^2 + 4x + 20 = 0$

44. $-x^4 + x^3 + 20x^2 = 0$

45. $\ln(x^2 - 3x - 5) = 0$

46. $3 - \dfrac{6}{x - 2} = 0$

47. $x^{\frac{5}{2}} - 4x^{\frac{3}{2}} - 5x^{\frac{1}{2}} = 0$

48. $x^{\frac{7}{3}} + x^{\frac{4}{3}} - 12x^{\frac{1}{3}} = 0$

49. $\ln(x^2 + 5x + 7) = 0$

50. $x^2 e^x - 3xe^x - 10e^x = 0$

51. $\ln(5x) - \ln(x+2) = 0$

Solve each trigonometric equation for x. Give all exact solutions on the interval $[0, 2\pi)$.

52. $2\sin^2 x - \sin x = 0$

53. $2\cos^2 x + \cos x - 1 = 0$

54. $\sin x + \cos x = 0$

55. $6\tan(2x) = 6$

56. $2\sin x \cos x = \sqrt{3}\cos x$

57. $\sec^2 x - \sec x = 2$
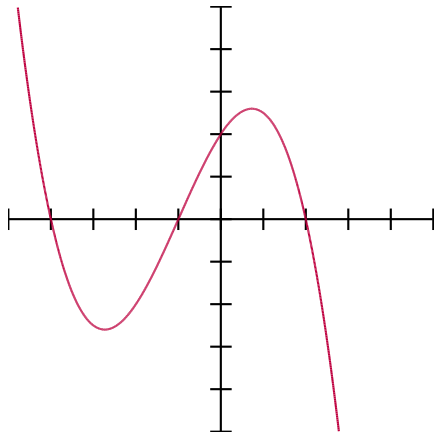
58. $2\sin^2 x - 3\cos x = 0$

59. $4\cos^2 x = 3$

60. $\tan^2\left(\dfrac{x}{2}\right) - 3 = 0$

Sketch a graph of each piecewise function

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

62. $f(x) = \begin{cases} e^{\frac{x}{\pi}} & x < \pi \\ \sin x & \pi \le x \le 2\pi \end{cases}$

63. Given the graph of f(x) below, identify the intervals where f is increasing and decreasing. Then identify where the values of f go from negative to positive and positive to negative.

64. Find the area of the region between the lines and the x-axis using formulas from Geometry. Show your work!!