

AP Calculus Summer Assignment

Bixler/Smith

Name _____

This assignment is to be completed without a calculator unless otherwise noted. All concepts on this worksheet are prerequisite knowledge and you are expected to know them by the first day of class. Concepts covered on problems #37-62 will be quickly revisited at the beginning of the year. This packet will not be collected but will be tested throughout the year without formal review.

For #1 – 12 Sketch the graph.

1. $y = \sqrt{x-1}$

2. $y = \sqrt{9-x^2}$

3. $y = \frac{|x|}{x}$

4. $y = \sin x$

5. $y = \cos x$

6. $y = \tan x$

7. $y = \cot x$

8. $y = \sec x$

9. $y = \csc x$

10. $y = e^x$

11. $y = \ln x$

12. $y = \begin{cases} -1, & x \leq -1 \\ 3x+2, & |x| < 1 \\ 7-2x, & x \geq 1 \end{cases}$

Find horizontal/vertical/slant asymptotes, symmetry and intercepts. Sketch the graph.

13. $y = \frac{2x^2 - 9}{x^2 - 4}$

14. $y = \frac{x^2 - 2x + 4}{x - 1}$

Solve.

15. $x^2 - x - 12 > 0$

16. $\frac{3x-2}{x+4} \leq 0$

Evaluate.

17. $\cos \frac{5\pi}{6}$

18. $\sin \frac{3\pi}{2}$

19. $\tan \frac{5\pi}{4}$

20. $\sec \frac{4\pi}{3}$

21. $\csc \frac{\pi}{4}$

22. $\cot \frac{2\pi}{3}$

23. $\tan \cos^{-1} - \frac{\sqrt{3}}{2}$

24. $\sec \arcsin - \frac{\sqrt{2}}{2}$

25. $\cos \sin^{-1} 2x$

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

26. $2 \cos^2 x + 3 \cos x - 2 = 0$

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

28. $\sin(2x) = \cos x$

29. $2 \cos \frac{x}{3} - \sqrt{3} = 0$

30. $2 \sin(3x) - \sqrt{3} = 0$

Solve using a CALCULATOR. Round your answers to three decimal places.

31. $e^{2x+3} = 37$

32. $e^x - 12e^{-x} - 1 = 0$

33. $\ln(5x-1) = 3$

34. $\log_2(x+3) + \log_2(x-1) = \log_2 12$

35. $\log_8(x+5) - \log_8(x-2) = 1$

36. Exponential growth is modeled by $n = n_0 e^{kt}$. A culture contains 500 bacteria when $t = 0$. After an hour, the number of bacteria is 1200.

(a) How many bacteria are there after four hours?

(b) After how many hours will there be 8000 bacteria?



For #37 – 42, evaluate using the given graph of $f(x)$.

37. $\lim_{x \rightarrow 3} f(x)$

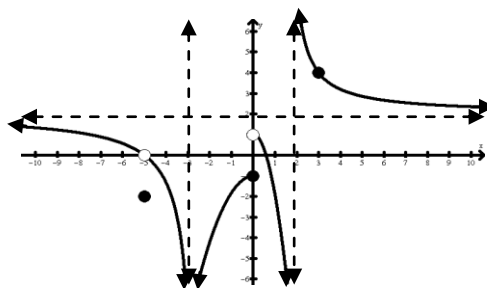
38. $\lim_{x \rightarrow \infty} f(x)$

39. $\lim_{x \rightarrow 2^+} f(x)$

40. $\lim_{x \rightarrow 0} f(x)$

41. $\lim_{x \rightarrow -\infty} f(x)$

42. $\lim_{x \rightarrow -5} f(x)$



For #43 – 62, evaluate.

43. $\lim_{x \rightarrow -3} \frac{x^2 + x - 6}{x + 3}$

44. $\lim_{x \rightarrow 0} \frac{(x-5)^2 - 25}{x}$

45. $\lim_{x \rightarrow 0} \frac{\sqrt{x+1} - 1}{x}$

46. $\lim_{x \rightarrow -6} \frac{x+6}{x^2 + 3x - 18}$

47. $\lim_{x \rightarrow -2} \frac{x^3 + 8}{x + 2}$

48. $\lim_{x \rightarrow \infty} \frac{3x - 5x^2}{4x^2 + 1}$

49. $\lim_{x \rightarrow -\infty} \frac{x^2 + 3x - 4}{4x^3 + x}$

50. $\lim_{x \rightarrow 3^-} \frac{1}{x-3}$

51. $\lim_{x \rightarrow 3} \frac{1}{x-3}$

52. $\lim_{x \rightarrow 3} \frac{1}{(x-3)^2}$

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

(a) $\lim_{x \rightarrow 1^-} f(x)$

(b) $\lim_{x \rightarrow 1^+} f(x)$

(c) $\lim_{x \rightarrow 1} f(x)$

54. $f(x) = \begin{cases} \frac{x^2 - x - 6}{x - 3}, & x \neq 3 \\ 4, & x = 3 \end{cases}$

(a) $\lim_{x \rightarrow 3} f(x)$

(b) $f(3)$

Use the definition of derivative (the long way) to find the derivative.

$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

55. $f(x) = x^2 - 8x$

56. $f(x) = \sqrt{x+9}$

Use the differential rules (the shortcut) to find the derivative.

57. $f(x) = 3x^4 - 5x^3 + 2x^{-1} + 6x^{\frac{2}{3}} - 12$

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

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

60. $f(x) = 6x + 5x^3 - 2$

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

62. Given the function $f(x) = x^4 - 3x^2 + 7$.

(a) Find $f'(x)$.

(b) Write the equation of the tangent line to f at $(1,5)$.

