AP Calculus BC Summer Assignment

MA433H

The purpose of this assignment is to provide you practice with the concepts you have learned in previous classes that you are expected to know how to do at the start of this class. If you have trouble with any section, please use your previous textbook or online materials for explanations / procedures, and seek out help from others if needed.

- Page 1: Show your work for each problem using the derivative rules that you learned (power, product, quotient).
- Page 2: Evaluate and/or solve the equations based on your knowledge of trigonometry (either by memory or drawing out circles and triangles).
- Page 3-8: Respond to the prompts without use of a calculator.

This packet will be due on the first day of class and will count towards your assignment category grade for Goal I. Assignments are graded on completion, effort, and following proper procedures. As this material lays the foundation of the course, it is important that you understand the concepts presented in this packet; however, because of that importance, the material will also be reviewed and assessed during the first few weeks of the school year.

Students will need a TI-84+ CE calculator for this course. Students will **not** be able to use a graphing calculator that can download documents from computers such as the TI-nspire CX or any graphing calculator that says CAS (Computer algebra system).

AP CALCULUS BC
Summer Assignment

Summer 2024: skip 4, 8, 10

Use the definition of the derivative to find the derivative of each function with respect to x.	
1. $f(x) = 2x^2 + 3x - 7$	
Differentiate each function with respect to x.	
3. $f(x) = 4x^3 + 5x + 4$	4. $f(x) = \sqrt{2x+1}(2x+1)$
5. $f(x) = \frac{x^2+3x+1}{x-1}$	6. $f(x) = \frac{x+1}{3x}$
7. $f(x) = (x-4)^{\frac{1}{2}}$	8. $f(x) = (4x^3 + 2x + 2)^4$
9. $f(x) = -3x^2 - \frac{1}{x} + 2$	10. $f(x) = \sqrt{2x+1}$
11. $f(x) = 123$	12. $f(x) = 25x$

Solve the following equations for $0 \leq x < 2\pi$, without the use of a calculator!!!	
13. $\sin x = \frac{1}{2}$	14. $\cos x = \frac{1}{2}$
15. $\cos x - \frac{\sqrt{3}}{2} = 0$	16. $\tan x = -1$
17. $\csc x = 2$	18. $\sin 2x = \frac{\sqrt{3}}{2}$

WITHOUT a calculator, determine the exact value of each expression. If the answer is an angle, then give the answer in both degrees and radians.	
23. $\sin 0$	24. $\sin \frac{\pi}{2}$
25. $\sin \frac{3\pi}{4}$	26. $\cos \pi$
27. $\cos \frac{\pi}{3}$	28. $\cos \frac{3\pi}{4}$
29. $\tan \frac{7\pi}{4}$	30. $\tan \frac{\pi}{6}$
31. $\tan \frac{2\pi}{3}$	32. $\sec \frac{\pi}{3}$
33. $\csc \frac{5\pi}{4}$	34. $\cot \frac{\pi}{2}$
35. $\sin^{-1} \frac{1}{2}$	36. $\arctan 1$

For each function, determine its domain and range.

Function	Domain	Range
38. $y = \sqrt{x-4}$		
39. $y = (x-3)^2$		
40. $y = \ln x$		
41. $y = e^x$		
42. $y = \sqrt{4-x^2}$		

Using the point-slope form $y - y_1 = m(x - x_1)$, write the equation for the line.

43. With slope -2, containing the point $(3,4)$	44. Containing points $(1,-3)$ and $(-5,2)$
45. With slope 0, containing the point $(3,4)$	46. Perpendicular to the line in #43, containing the point $(3,4)$

Simplify the following.

47. $\frac{\sqrt{x}}{x}$	48. $e^{\ln x}$
49. $e^{1+\ln x}$	50. $\ln 1$
51. $\ln e^7$	52. $\log_3 \frac{1}{3}$
53. $\log_{1/2} 8$	
54. $27^{\frac{2}{3}}$	

Evaluate each limit

59. $\lim_{x\to 0}(x+2)$

60. $\lim_{x\to\infty}\frac{3x^4+3x^2+2}{5x^4-4x-3}$

61. $\lim_{x\to\infty}\frac{3x^4+3x^2+2}{5x^3-4x-3}$

62. $\lim_{x\to\infty}\frac{3x^3+3x^2+2}{5x^4-4x-3}$

63. $\lim_{x\to\infty}\sqrt{\frac{2x^2+4}{x^2+3}}$

64. $\lim_{x\to\infty}\frac{\sqrt{3x^2+1}}{2x}$

65. $\lim_{x\to 2}\frac{x^2-4}{x-2}$

66. $\lim_{x\to 2^-}\frac{1}{x-2}$

67. $\lim_{x\to 2^+}\frac{1}{x-2}$

68. $\lim_{x\to 0}\frac{1}{x-2}$

69. $\lim_{x\to 0}\frac{(4-x)^2-16}{x}$

70. $\lim_{x\to\infty}\cos\frac{1}{x}$

Given $f(x) = x^2 - 2x + 5$, find the following.

1. $f(-2) =$

3. $f(x + h) =$

Use the graph $f(x)$ to answer the following.

4. $f(0) =$

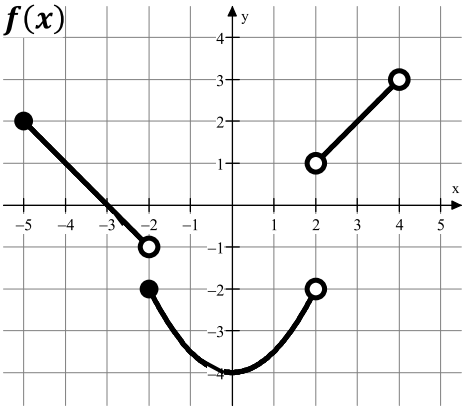
$f(4) =$

$f(-2) =$

$f(2) =$

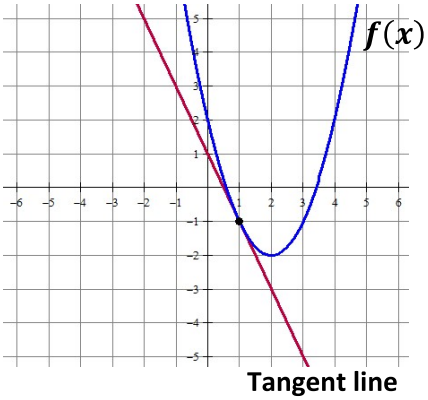
$f(3) =$

$f(x) = 2$ when x = ?

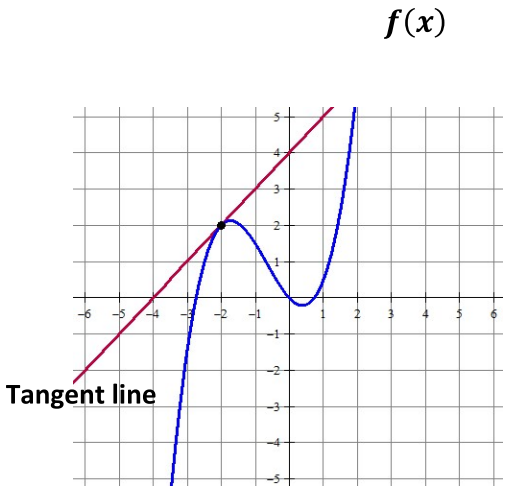


Write the equation of the tangent line in point slope form. $y - y_1 = m(x - x_1)$

8. The line tangent to $f(x)$ at $x = 1$



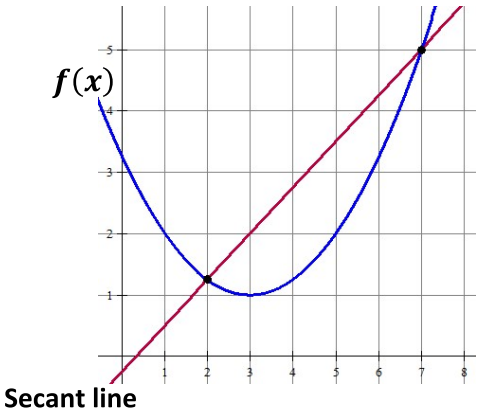
9. The line tangent to $f(x)$ at $x = -2$



MULTIPLE CHOICE! Remember slope = $\frac{y_2-y_1}{x_2-x_1}$

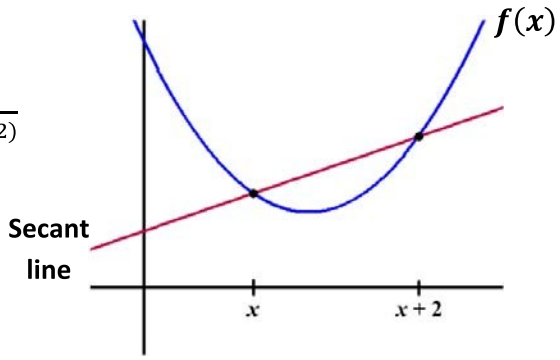
10. Which letter represents the slope of the secant line shown?

A) $\frac{7-2}{f(7)-f(2)}$ B) $\frac{f(7)-2}{7-f(2)}$ C) $\frac{7-f(2)}{f(7)-2}$ D) $\frac{f(7)-f(2)}{7-2}$



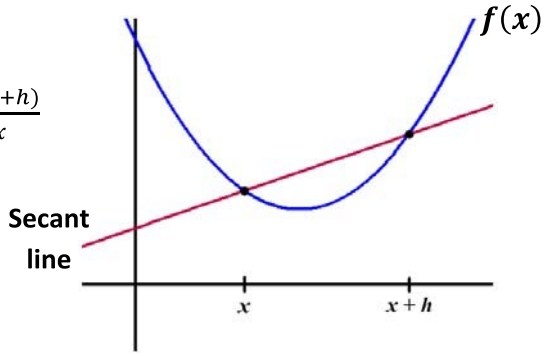
11. Which letter represents the slope of the secant line shown?

A) $\frac{f(x)-f(x+2)}{x+2-x}$ B) $\frac{f(x+2)-f(x)}{x+2-x}$ C) $\frac{f(x+2)-f(x)}{x-(x+2)}$ D) $\frac{x+2-x}{f(x)-f(x+2)}$



12. Which letter represents the slope of the secant line shown?

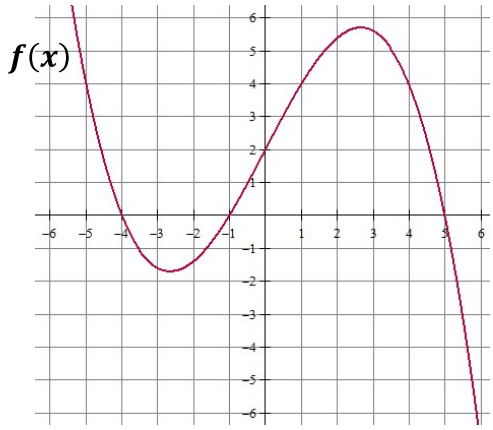
A) $\frac{f(x+h)-f(x)}{x-(x+h)}$ B) $\frac{x-(x+h)}{f(x+h)-f(x)}$ C) $\frac{f(x+h)-f(x)}{x+h-x}$ D) $\frac{f(x)-f(x+h)}{x+h-x}$



13. Which of the following statements about the function $f(x)$ is true?

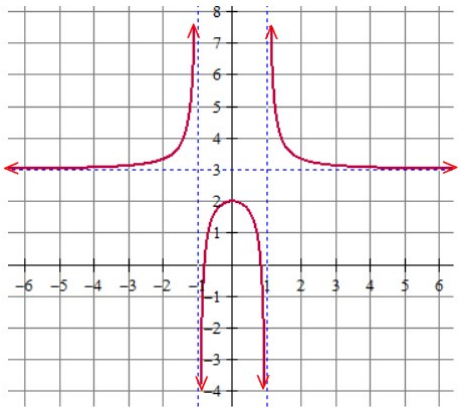
I. $f(2) = 0$
II. $(x + 4)$ is a factor of $f(x)$
III. $f(5) = f(-1)$

(A) I only
(B) II only
(C) III only
(D) I and III only
(E) II and III only



Find the domain and range (express in interval notation). Find all horizontal and vertical asymptotes.

14.



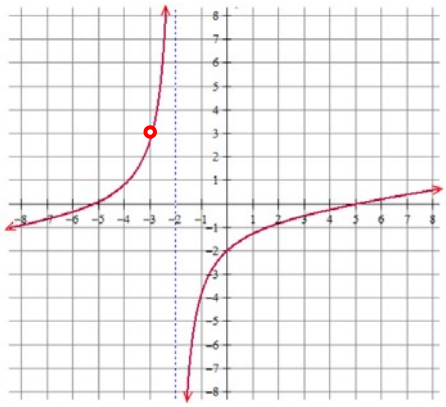
Domain:

Range:

Horizontal Asymptote(s):

Vertical Asymptotes(s):

16.



Domain:

Range:

Horizontal Asymptote(s):

Vertical Asymptotes(s):

MULTIPLE CHOICE!

17. Which of the following functions has a vertical asymptote at $= 4$?

(A) $\frac{x+5}{x^2-4}$
(B) $\frac{x^2-16}{x-4}$
(C) $\frac{4x}{x+1}$
(D) $\frac{x+6}{x^2-7x+12}$
(E) None of the above

18. Consider the function: $(x) = \frac{x^2-5x+6}{x^2-4}$. Which of the following statements is true?

I. $f(x)$ has a vertical asymptote of $x = 2$
II. $f(x)$ has a vertical asymptote of $x = -2$
III. $f(x)$ has a horizontal asymptote of $y = 1$

(A) I only

(B) II only

(C) I and III only

(D) II and III only

(E) I, II and III

Textbook Problems.

Please complete the following problems from your AP Calculus BC textbook:

pg 21: 10, 32, 65

pg 35: 4

pg 43: 6, 56

pg 51: 32

pg 58: 26

pg 71: 22, 38, 53, 59, 60, 66