

Name: _____

Date: _____

The AP Calculus Summer Review
NO CALCULATOR & NO DECIMALS!!!

Let $f(x) = x^2 - 2x + 5$. Find the following:

1. $f(-2)$

2. $f(x + 2)$

3. $f(x + h)$

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

4. $f(0) =$

$f(4) =$

$f(-1) =$

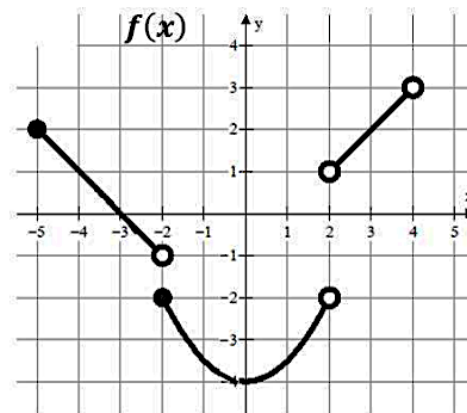
$f(-2) =$

$f(2) =$

$f(3) =$

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

$f(x) = -3$ when $x = ?$



Write the equation of the line that meets the following criteria. Use slope-intercept $y = mx + b$ or point slope form $y - y_1 = m(x - x_1)$.

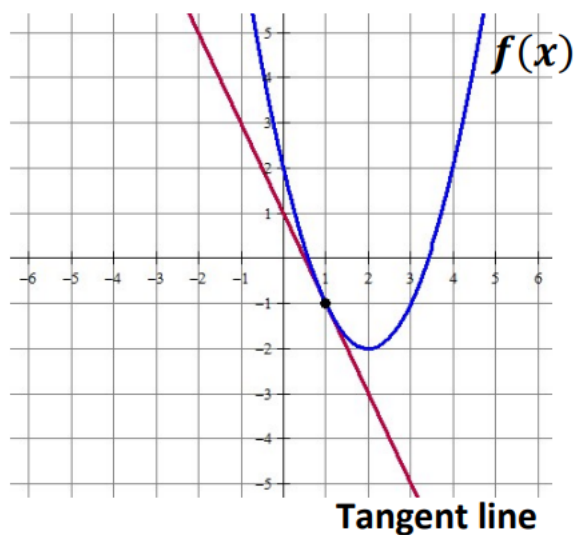
5. $m = 3$ and $(4, -2)$

6. $m = -\frac{3}{2}$ and $f(-5) = 7$

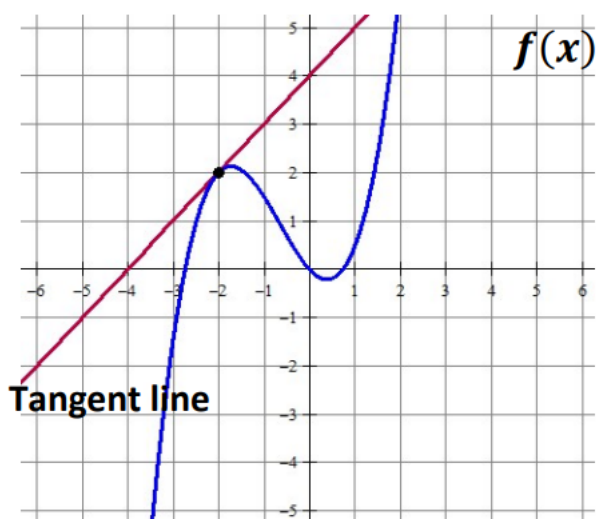
7. $f(4) = -8$ and $f(-3) = 12$

Write the equation of the tangent line shown in slope-intercept form.

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



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



Multiple Choice! Remember SLOPE = $\frac{y_2 - y_1}{x_2 - x_1}$

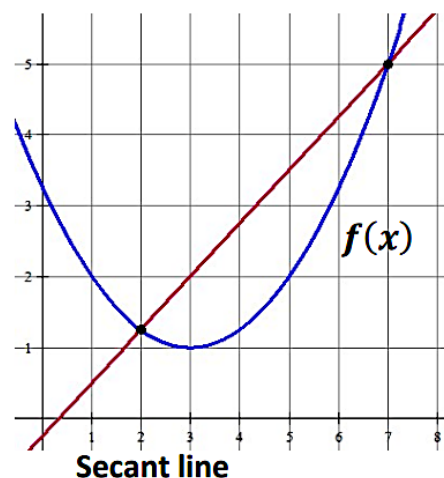
10. Which of the following represents the slope of the secant line?

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) $\frac{f(7) - f(2)}{7 - 2}$



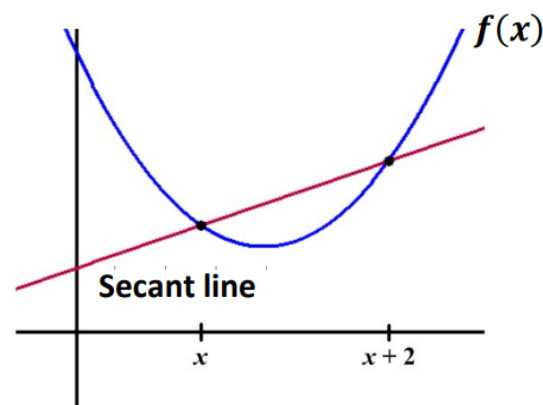
11. Which of the following represents the slope of the secant line?

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) $\frac{x + 2 - x}{f(x) - f(x + 2)}$



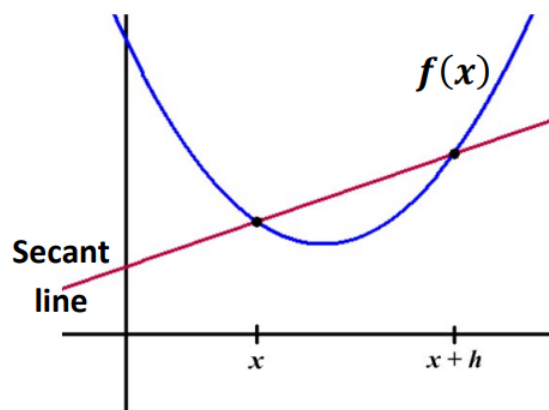
12. Which of the following represents the slope of the secant line?

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

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

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

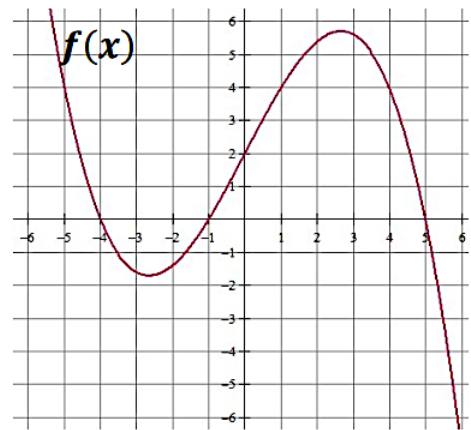
D) $\frac{f(x) - f(x + h)}{x + h - x}$



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

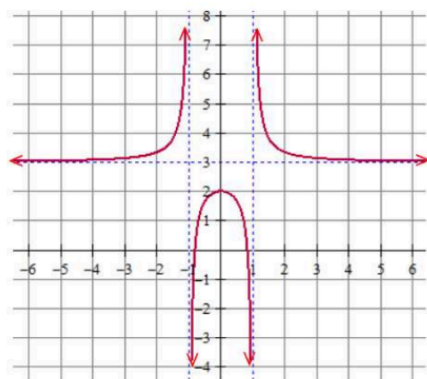
- I. $f(2) = 0$
- II. $(x + 4)$ is a factor of $f(x)$
- III. $f(5) = f(-1)$

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



State the domain and range of the function in interval notation. Find all horizontal and vertical asymptotes.

14.



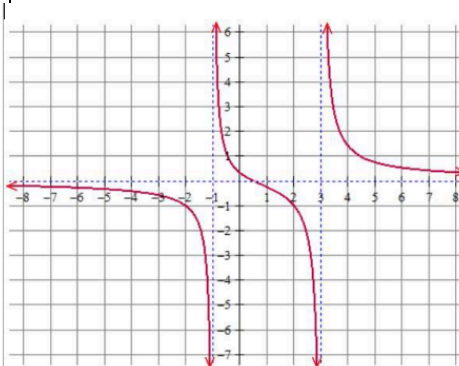
Domain:

Range:

Horizontal Asymptote(s):

Vertical Asymptote(s):

15.



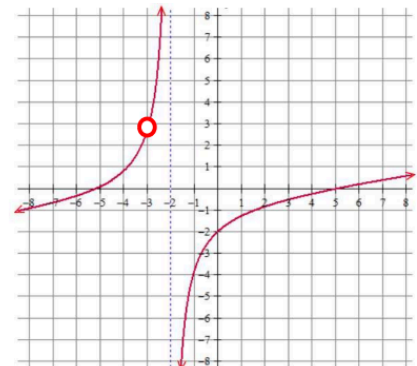
Domain:

Range:

Horizontal Asymptote(s):

Vertical Asymptote(s):

16.



Domain:

Range:

Horizontal Asymptote(s):

Vertical Asymptote(s):

Multiple Choice!

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

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

Rewrite the following using rational exponents. For example, $\frac{1}{\sqrt[3]{x^2}} = x^{-2/3}$

19. $\sqrt[5]{x^3} + \sqrt[5]{2x}$

20. $\sqrt{x+1}$

21. $\frac{1}{\sqrt{x+1}}$

22. $\frac{1}{\sqrt{x}} - \frac{2}{x}$

23. $\frac{1}{4x^3} + \frac{1}{2}\sqrt[4]{x^3}$

24. $\frac{1}{4\sqrt{x}} - 2\sqrt{x+1}$

Rewrite each expression in radical form and positive exponents. For example, $x^{-2/3} + x^{-2} = \frac{1}{\sqrt[3]{x^2}} + \frac{1}{x^2}$

25. $x^{-1/2} - x^{3/2}$

26. $\frac{1}{2}x^{-1/2} + x^{-1}$

27. $3x^{-1/2}$

28. $(x + 4)^{-1/2}$

29. $x^{-2} + x^{1/2}$

30. $2x^{-2} + \frac{3}{2}x^{-1}$

Solve the following equations. Remember $e^0 = 1$ and $\ln 1 = 0$

31. $e^x + 1 = 2$

32. $3e^x + 5 = 8$

33. $e^{2x} = 1$

34. $\ln x = 0$

35. $3 - \ln x = 3$

36. $\ln(3x) = 0$

37. $x^2 - 3x = 0$

38. $e^x + xe^x = 0$

39. $e^{2x} - e^x = 0$

MUST know trig values in radians! You can use the Unit Circle or Special Right Triangles for the following.

40. $\sin \frac{\pi}{6}$	41. $\cos \frac{\pi}{4}$	42. $\sin 2\pi$
43. $\tan \pi$	44. $\sec \frac{\pi}{2}$	45. $\cos \frac{\pi}{6}$
46. $\sin \frac{\pi}{3}$	47. $\sin \frac{3\pi}{2}$	48. $\tan \frac{\pi}{4}$
49. $\csc \frac{\pi}{2}$	50. $\sin \pi$	51. $\cos \frac{\pi}{3}$
52. Find x where $0 \leq x \leq 2\pi$ $\sin x = \frac{1}{2}$	53. Find x where $0 \leq x \leq 2\pi$: $\tan x = 0$	54. Find x where $0 \leq x \leq 2\pi$: $\cos x = -1$

Solve the following trig equations where $0 \leq x \leq 2\pi$.

55. $\sin x = \frac{1}{2}$	56. $\cos x = -1$	57. $\cos x = \frac{\sqrt{3}}{2}$
58. $2 \sin x = -1$	59. $\cos x = \frac{\sqrt{2}}{2}$	60. $\cos \left(\frac{x}{2}\right) = \frac{\sqrt{3}}{2}$
61. $\tan x = 0$	62. $\sin(2x) = 1$	63. $\sin \left(\frac{x}{4}\right) = \frac{\sqrt{3}}{2}$

State the domain and range of each function as an interval or inequality.

<i>Function</i>	<i>Domain</i>	<i>Range</i>
64. $f(x) = \sqrt{x - 4}$		
65. $g(x) = (x - 3)^2$		
66. $y = \ln x$		
67. $y = e^x$		
68. $y = \sqrt{4 - x^2}$		

Simplify.

69. $\frac{\sqrt{x}}{x}$	70. $e^{\ln x}$	71. $e^{1+\ln x}$
72. $\ln 1$	73. $\ln e^7$	74. $\log_3 \frac{1}{3}$
75. $\log_{1/2} 8$	76. $\ln \frac{1}{2}$	77. $27^{2/3}$
78. $(5a^{2/3})(4a^{3/2})$	79. $\frac{4xy^{-2}}{12x^{-1/3}y^{-5}}$	80. $(4a^{5/3})^{3/2}$

Use the functions defined below to determine each of the following.

$$f(x) = \{(3, 5), (2, 4), (1, 7)\}$$

$$g(x) = \sqrt{x-3}$$

$$h(x) = \{(3, 2), (4, 3), (1, 6)\}$$

$$k(x) = x^2 + 5$$

81. $(f + h)(1)$

82. $(k - g)(5)$

83. $f(h(3))$

84. $g(k(7))$

85. $h(3)$

86. $g(g(9))$

87. $f^{-1}(4)$

88. $k^{-1}(x)$

89. $k(g(x))$

90. $g(f(2))$

Fill out the Unit Circle.

