AP CALCULUS AB Name: _____

SUMMER PACKET

Complete each question below <u>WITHOUT A CALCULATOR!</u>

Given $f(x) = x^2 - 2x + 5$, determine the following:

1. $f(-3) =$

2. $f(x+1) =$

3. $f(x+h) =$

4. Use the graph of $f(x)$ (on the right) to answer the following:

a) $f(0) =$

b) $f(4) =$

c) $f(-5) =$

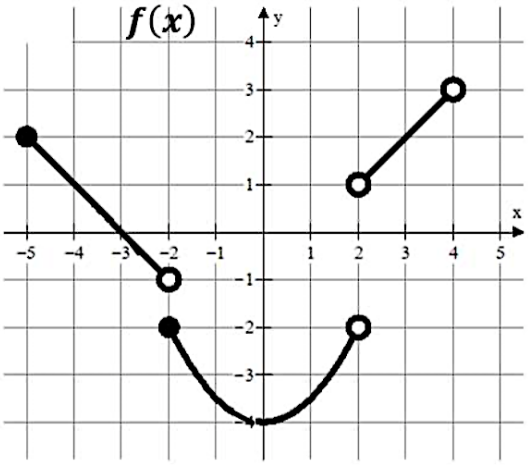
d) $f(-2) =$

e) $f(2) =$

f) $f(3) =$

g) $f(x) = 0$ when $x = ?$

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



Write an equation of a line in point-slope form ($y - y_1 = m(x - x_1)$) that meets the given conditions.

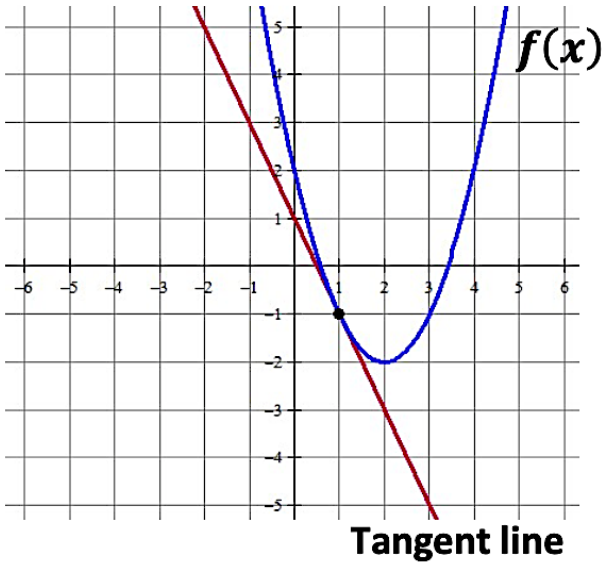
5. Slope = 3 and point $(4, -5)$

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

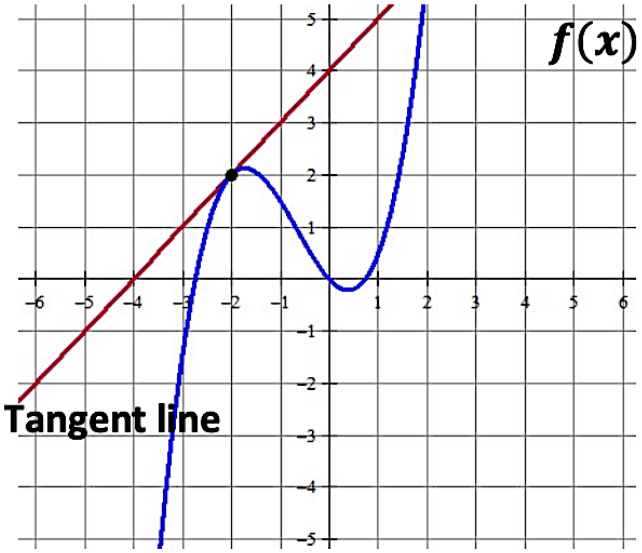
A tangent line (introduced back in Geometry) is a line that touches/intersects a curve at only one point.

Write the equation of the tangent line shown in each graph using point-slope form: $y - y_1 = m(x - x_1)$

7.

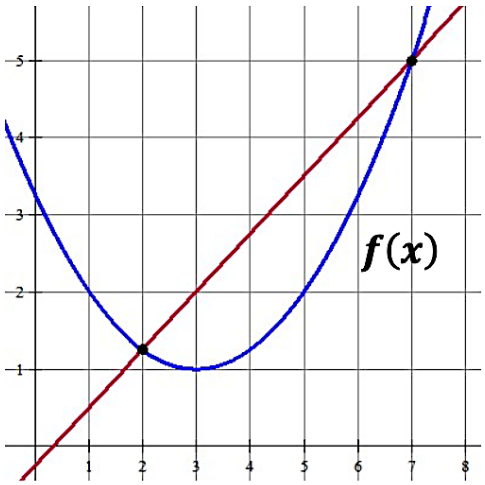


8.



A secant line intersects a curve at two points.

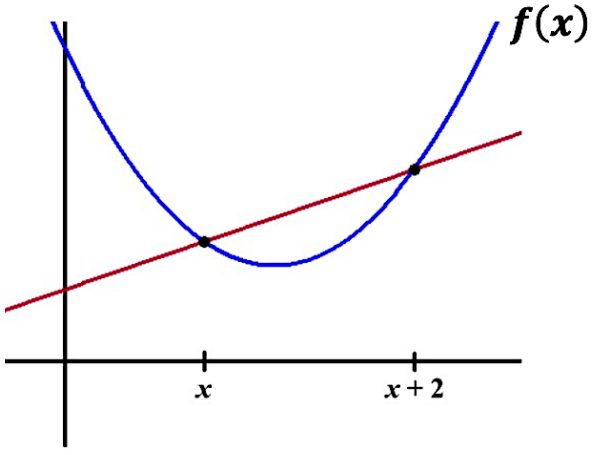
9. Which choice represents the slope of the secant line shown?



A $\dfrac{7-2}{f(7)-f(2)}$ **B** $\dfrac{f(7)-2}{7-f(2)}$

C $\dfrac{7-f(2)}{f(7)-2}$ **D** $\dfrac{f(7)-f(2)}{7-2}$

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



A $\dfrac{f(x)-f(x+2)}{x+2-x}$ **B** $\dfrac{f(x+2)-f(x)}{x+2-x}$

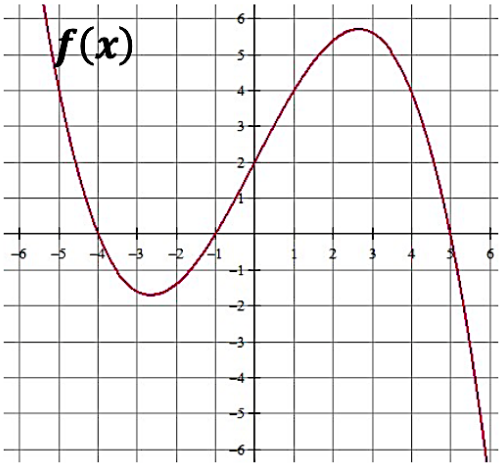
C $\dfrac{f(x+2)-f(x)}{x-x+2}$ **D** $\dfrac{x+2-x}{f(x)-f(x+2)}$

11. 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

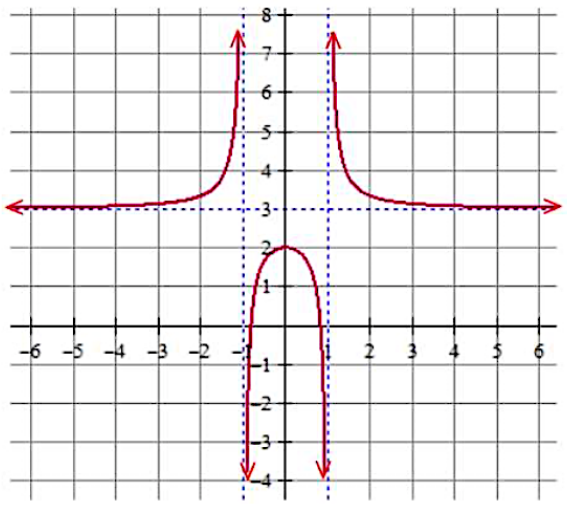
C III only

D I and III only

E II and III only

List the domain and range of the rational function shown. (Use interval notation)
Find all horizontal and vertical asymptotes.

12.



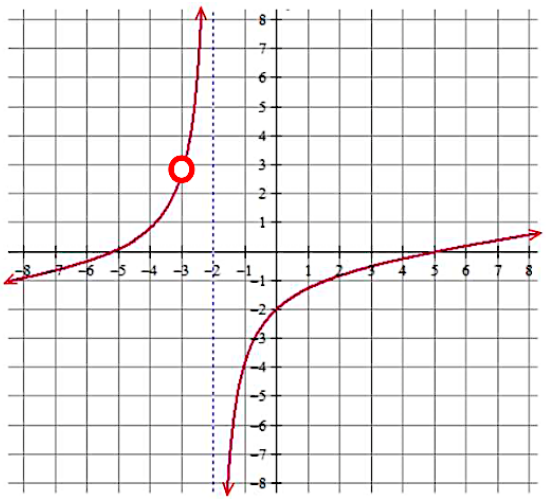
Domain:

Range:

Horizontal Asymptote:

Vertical Asymptote:

13.



Domain:

Range:

Horizontal Asymptote:

Vertical Asymptote:

14. 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** $\frac{x+6}{x^2-7x+12}$

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

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 (and/or negative) exponents. (Example: $\frac{1}{\sqrt[3]{x^2}} = x^{-\frac{2}{3}}$)

16. $\sqrt{x+1}$

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

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

Write each expression using radical (and positive) exponents.

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

20. $3x^{-\frac{1}{2}}$

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

Determine the following values (in RADIANS) using a Unit-Circle or special right triangles.

22. $\cos\frac{\pi}{4}$

23. $\sin 2\pi$

24. $\tan\pi$

25. $\sec\frac{\pi}{2}$

26. $\cos 2\pi$

27. $\sin\pi$

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

29. $\tan\frac{\pi}{4}$

30. $\cos\pi$

Solve the following trigonometric equations ($0 \le x \le 2\pi$).

31. $\sin x = \frac{1}{2}$

32. $\cos x = -1$

33. $\cos x = \frac{\sqrt{3}}{2}$

34. $\cos x = \frac{\sqrt{2}}{2}$

35. $2\sin x = -1$

36. $\sin(2x) = 1$

Solve. Recall that $e^0 = 1$ and $\ln 1 = 0$.

37. $e^x + 1 = 2$

38. $3e^x + 5 = 8$

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

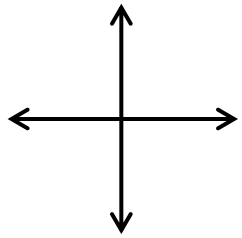
40. $3 - \ln x = 3$

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

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

For each function listed, draw a quick sketch and determine the domain and range.

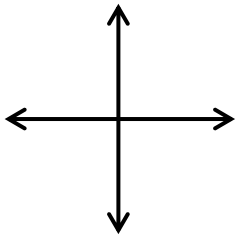
43. $y = \sqrt{x-4}$



Domain:

Range:

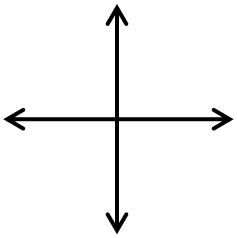
44. $y = (x+3)^2$



Domain:

Range:

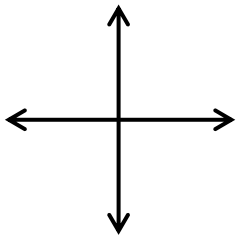
45. $y = \ln x$



Domain:

Range:

46. $y = e^x$



Domain:

Range:

Simplify the expression using log and exponent rules.

47. $e^{\ln x}$

48. $e^{1+\ln x}$

49. $\ln 1$

50. $\ln e^7$

51. $\log_3 \frac{1}{3}$

52. $27^{\frac{2}{3}}$

Given that $f(x) = \{(3,5),(2,4),(1,7)\}$, $h(x) = \{(3,2),(4,3),(1,6)\}$, $g(x) = \sqrt{x-3}$ and $k(x) = x^2 + 5$, determine the following:

53. $h(3)$

54. $g(k(7))$

55. $f(h(3))$

56. $g(g(12))$

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

58. $k(g(x))$

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

60. $g(f(2))$