

Calculus - SUMMER PACKET

NAME: _____

Summer + Math = (Best Summer Ever)²

(complete as much as you can without using a calculator!)

NO CALCULATOR!!!

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

1. $f(-2) =$

2. $f(x + 2) =$

3. $f(x + h) =$

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

4. $f(0) =$

$f(4) =$

$f(-1) =$

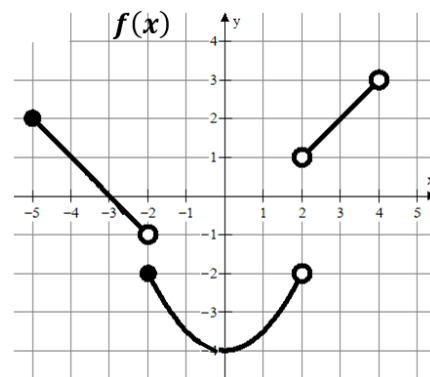
$f(-2) =$

$f(2) =$

$f(3) =$

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

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



Write the equation of the line meets the following conditions. Use point-slope form.

$y - y_1 = m(x - x_1)$

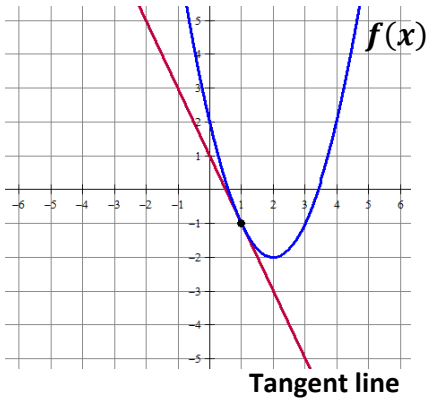
5. slope = 3 and $(4, -2)$

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

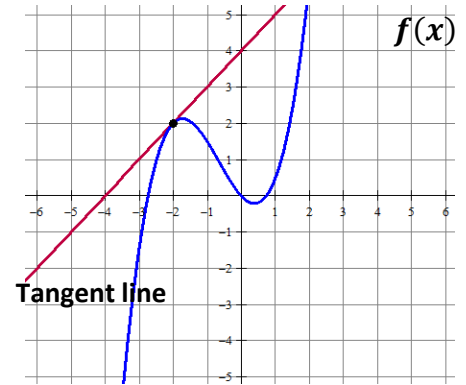
7. $f(4) = -8$ and $f(-3) = 12$

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

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



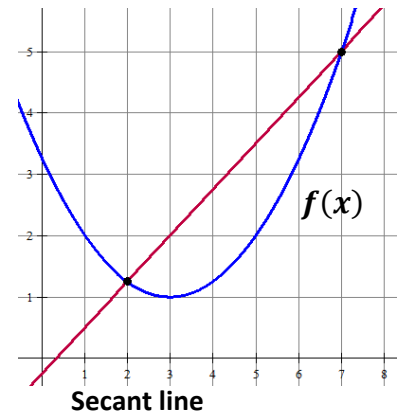
9. The line tangent to $f(x)$ at $x = -2$



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

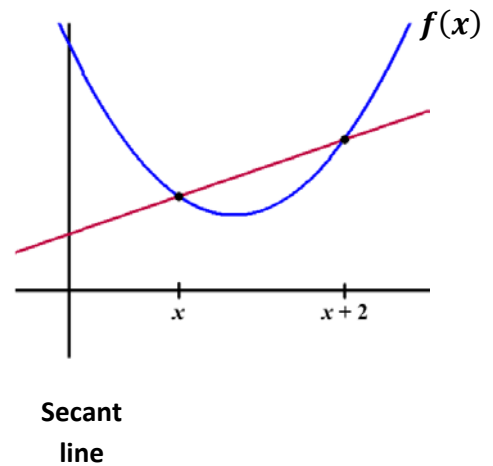
10. Which choice represents the slope of the secant line shown?

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



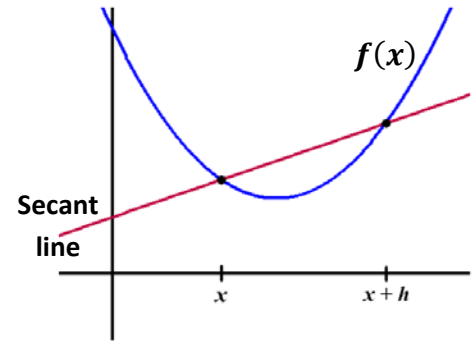
11. Which choice represents the slope of the secant line shown?

- 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 choice represents the slope of the secant line shown?

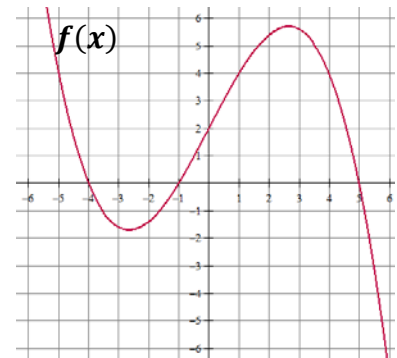
- A) $\frac{f(x+h)-f(x)}{x-(x+h)}$ B) $\frac{x-(x+h)}{f(x+h)-f(x)}$ C) $\frac{f(x+h)-f(x)}{x+h-x}$
- D) $\frac{f(x)-f(x+h)}{x+h-x}$



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

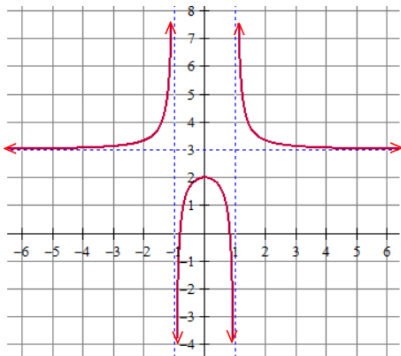
- I. $f(2) = 0$
 II. $(x + 4)$ is a factor of $f(x)$
 III. $f(5) = f(-1)$

- (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.



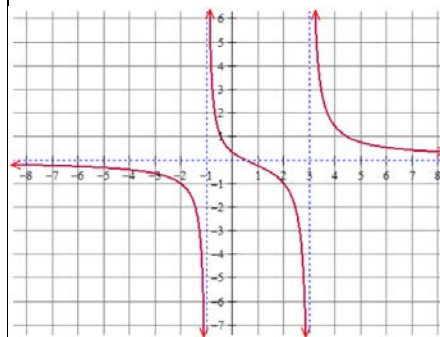
Domain:

Range:

Horizontal Asymptote(s):

Vertical Asymptotes(s):

15.



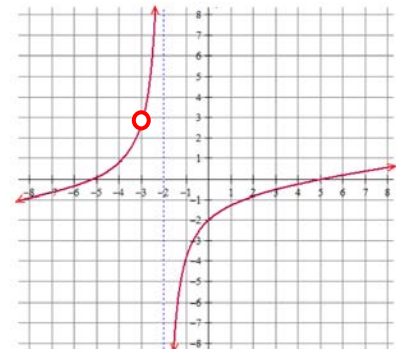
Domain:

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 $x = 4$?

(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. Example: $\frac{1}{\sqrt[3]{x^2}} = x^{-\frac{2}{3}}$

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

Write each expression in radical form and positive exponents. Example: $x^{-\frac{2}{3}} + x^{-2} = \frac{1}{\sqrt[3]{x^2}} + \frac{1}{x^2}$

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

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

27. $3x^{-\frac{1}{2}}$

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

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

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

You need to know these WITHOUT a calculator!

Need to know basic trig functions in RADIANS! We never use degrees. You can either use the Unit Circle or Special Triangles to find the following.

31. $\sin \frac{\pi}{6}$	32. $\cos \frac{\pi}{4}$	33. $\sin 2\pi$
34. $\tan \pi$	35. $\sec \frac{\pi}{2}$	36. $\cos \frac{\pi}{6}$
37. $\sin \frac{\pi}{3}$	38. $\sin \frac{3\pi}{2}$	39. $\tan \frac{\pi}{4}$
40. $\csc \frac{\pi}{2}$	41. $\sin \pi$	42. $\cos \frac{\pi}{3}$
43. Find x where $0 \leq x \leq 2\pi$, $\sin x = \frac{1}{2}$	44. Find x where $0 \leq x \leq 2\pi$, $\tan x = 0$	45. Find x where $0 \leq x \leq 2\pi$, $\cos x = -1$

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

46. $e^x + 1 = 2$	47. $3e^x + 5 = 8$	48. $e^{2x} = 1$
49. $\ln x = 0$	50. $3 - \ln x = 3$	51. $\ln(3x) = 0$
52. $x^2 - 3x = 0$	53. $e^x + xe^x = 0$	54. $e^{2x} - e^x = 0$

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. $\sin\left(\frac{x}{4}\right) = \frac{\sqrt{3}}{2}$

For each function, determine its domain and range.

Function

Domain

Range

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

65. $y = (x - 3)^2$

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

78. $(5a^{2/3})(4a^{3/2})$

79. $\frac{4xy^{-2}}{12x^{-\frac{1}{3}}y^{-5}}$

80. $(4a^{5/3})^{3/2}$

If $f(x) = \{(3, 5), (2, 4), (1, 7)\}$ $g(x) = \sqrt{x-3}$, then determine each of the following.
 $h(x) = \{(3, 2), (4, 3), (1, 6)\}$ $k(x) = x^2 + 5$

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. $g(f(2))$