AB Calculus – Chapter P (Day 1) – Functions, Function Properties, and their Graphs

Evaluating a Function:

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. $f(0) =$ $\qquad$ $f(4) =$

$\quad$ $f(-1) =$ $\qquad$ $f(-2) =$
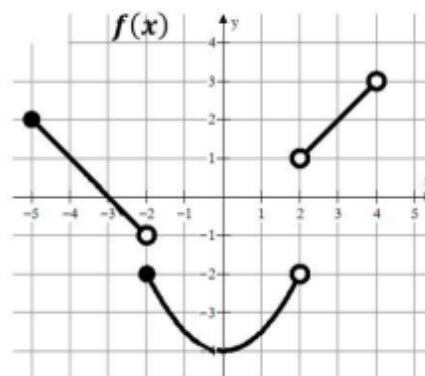
$\quad$ $f(2) =$ $\qquad$ $f(3) =$

$\quad$ $f(x) = 2$ when $x = ?$ $\qquad$ $f(x) = -3$ when $x = ?$

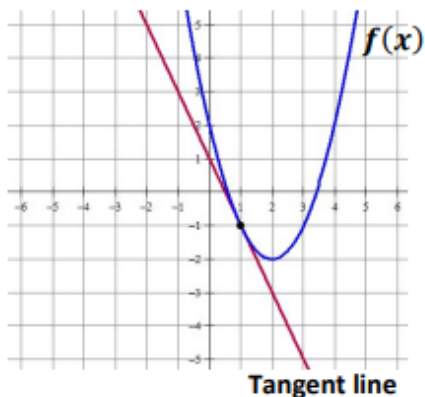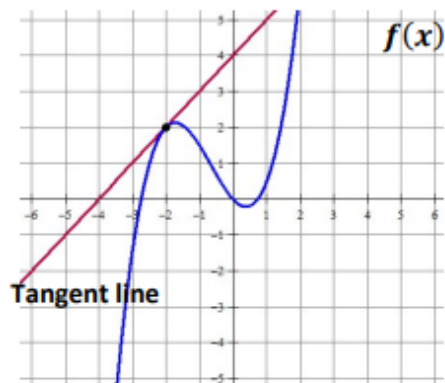| Write the equation of the line meets the following conditions. Use point-slope form. $y - y_1 = m(x - x_1)$		
5. slope $= 3$ and $(4, -2)$	6. $m = -\frac{3}{2}$ and $f(-5) = 7$	7. $f(4) = -8$ and $f(-3) = 12$

Write the equation of the tangent line in point slope form. $y - y_1 = m(x - x_1)$
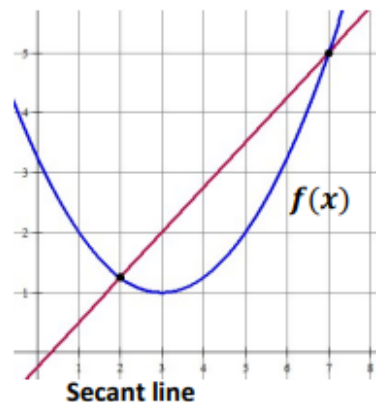
8. The line tangent to $f(x)$ at $x = 1$

Tangent line

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

Tangent line

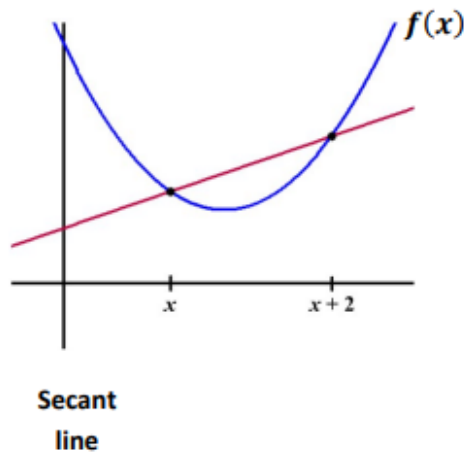**MULTIPLE CHOICE! Remember slope** $= \dfrac{y_2 - y_1}{x_2 - x_1}$

10. 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) $\dfrac{f(7)-f(2)}{7-2}$

Secant line

11. 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) $\dfrac{x+2-x}{f(x)-f(x+2)}$

Secant line

Find all Vertical Asymptotes, Horizontal Asymptotes, Holes, and x-intercepts (for Rational Functions)

I. **To Find Vertical Asymptotes:** Set Denominator Factors equal to zero and solve for x. (Make sure factors do not cancel with numerator)

II. **To Find Holes in graph:** Identify factors that cancels out between numerator and denominator. Set factor equal to zero and solve for x. To find the point (ordered pair), find y-value using the original function graph.

III. **To Find Horizontal Asymptote:** Compare Degrees between Numerator (N) and Denominator (D)
   a) If **N = D**, then horizontal asymptote is **y = (ratio of leading coefficients)**
   b) If **N < D**, the horizontal asymptote is **y = 0**
   c) If **N > D**, there is **no horizontal asymptote.**

9. $f(x) = \dfrac{x+2}{3-x}$

10. $f(x) = \dfrac{4x-4}{x^2-9}$

Holes: _____

Vertical Asymptotes: _____

Horizontal Asymptote: _____

x-intercept: _____

Holes: _____

Vertical Asymptotes: _____

Horizontal Asymptote: _____

x-intercept: _____

11. $f(x) = \dfrac{x^2-2x}{x^3-5x^2+6x}$

12. $f(x) = \dfrac{5x^2+2}{3x^2-12}$

Holes: _____

Vertical Asymptotes: _____

Horizontal Asymptote: _____
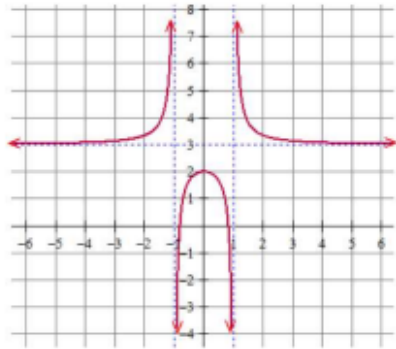
x-intercept: _____

Holes: _____

Vertical Asymptotes: _____

Horizontal Asymptote: _____

x-intercept: _____

Find the domain and range (express in interval notation). Find all horizontal and vertical asymptotes.
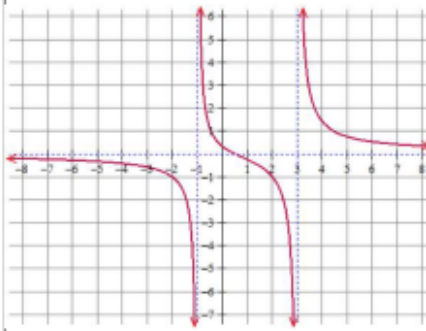
14.

Domain:

Range:

Horizontal Asymptote(s):

Vertical Asymptotes(s):
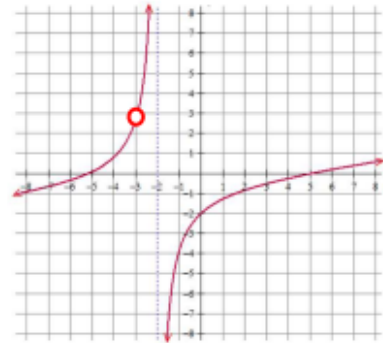
15.

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) $\dfrac{x+5}{x^2-4}$

(B) $\dfrac{x^2-16}{x-4}$

(C) $\dfrac{4x}{x+1}$

(D) $\dfrac{x+6}{x^2-7x+12}$

(E) None of the above

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18. Consider the function: $(x) = \dfrac{x^2-5x+6}{x^2-4}$. 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