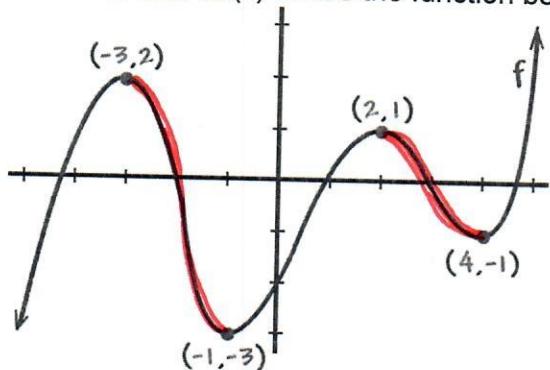


Pre-Calculus

CBA #2 (Rational & Polynomial Functions) Review

You will be allowed a calculator for the entire CBA (12 questions).

- List the interval(s) where the function below is decreasing.



use x values for intervals

$$(-3, -1) \cup (2, 4)$$

- Find all solutions to the following equation.

- Factor equation
- set each factor to zero

$$x^3 - 15x^2 + 56x = 0$$

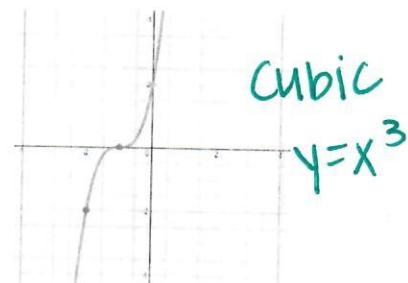
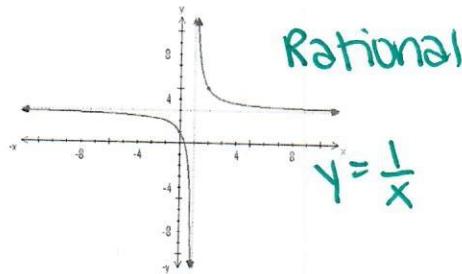
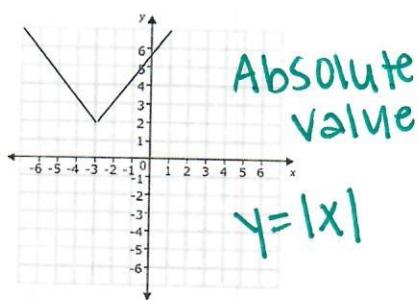
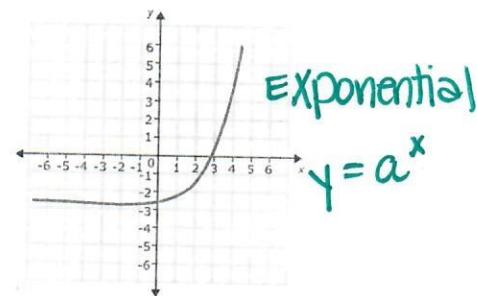
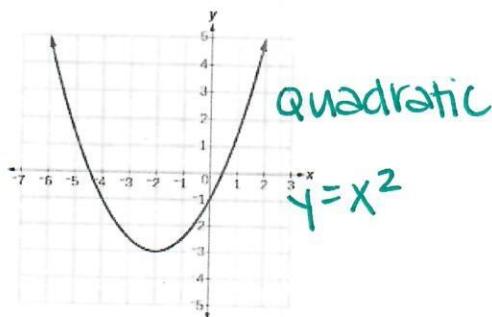
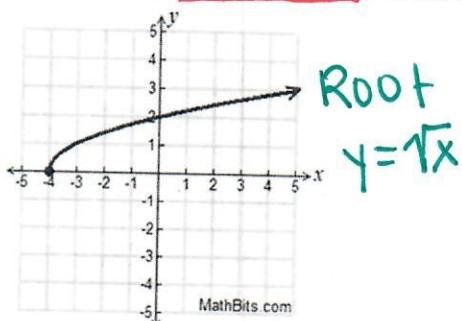
$$x(x^2 - 15x + 56) = 0$$

$$x(x-7)(x-8) = 0$$

$$x = 0 \quad x-7=0 \quad x-8=0$$

$$\{0, 7, 8\}$$

- What is the parent function of each graph?



- List the transformations of the function $-0.3 f(x+4) - 5$, when $f(x) = x^7$

Vertical shift: down 5

Horizontal shift: left 4

Vertical Compression/Stretch: by scale factor of 0.3

Horizontal Compression/Stretch: none

Reflect over x-axis
(negative outside)

↑ vertical shift
Horizontal shift (opposite)

$$\begin{cases} y_1 = x^7 \\ y_2 = -0.3(x+4)^7 - 5 \end{cases}$$

multiplier outside →
vertical stretch (whole #)
OR vertical compression (fraction/decimal)
multiplier inside →
horizontal stretch (fraction/decimal)
OR horizontal compression (whole #)

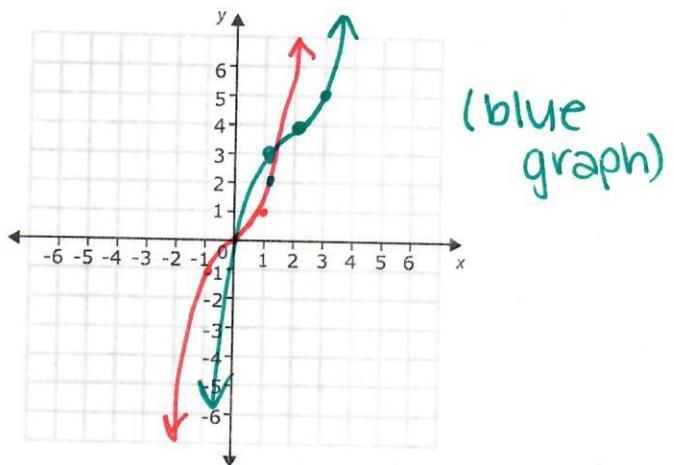
Pre-Calculus

CBA #2 (Rational & Polynomial Functions) Review

5. Graph $g(x) = f(x - 2) + 4$ when $f(x) = x^3$

\rightarrow Right 2
 \rightarrow UP 4

↑
Parent Function

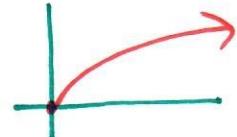


6. Graph $f(x) = 3x^{0.5}$ and answer the questions

type into calculator

- a) What is the domain of $f(x)$?

$$[0, \infty)$$



- b) Does this function have a zero? (x-intercept)

yes, at $x=0$

- c) Is the function increasing or decreasing?

increasing

- d) Does $f(x)$ have any relative minima or maxima?

no, only absolute

7. Ayma is investigating digestive patterns in arachnids. She has discovered that the resting metabolic rate of an arachnid can be represented as a power function in terms of the mass of the arachnid given by:

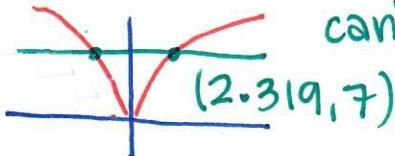
$$R(m) = 5m^{\frac{2}{5}}$$

$R(m)$ represents the resting metabolic rate, RMR, and m represents the mass of the arachnid in grams. For approximately what body masses of arachnids will the RMR be less than or equal to 7? Round to the nearest thousandth of a gram. Think critically whether the body mass of a spider can equal to the end points of your solution.

$$y_1 = 5x^{\frac{2}{5}}$$

$$y_2 = 7$$

intersection



can't have negative body mass
or 0 body mass

$$(0, 2.319]$$

8. Given the function, $f(x) = x^4 - x^3 - 6x^2$, on what intervals is $f(x) > 0$?

• Find roots

• make sign chart

• $>$ positive
 $<$ negative

$$x^2(x^2 - x - 6) > 0$$

$$x^2(x-3)(x+2) > 0$$

$$x=0 \quad x=3 \quad x=-2$$

← not equal to



$$(-\infty, -2) \cup (3, \infty)$$

Pre-Calculus

CBA #2 (Rational & Polynomial Functions) Review

9. Graph the function: $f(x) = \frac{3x-6}{x^2-4}$. Label any asymptotes or removable discontinuities.

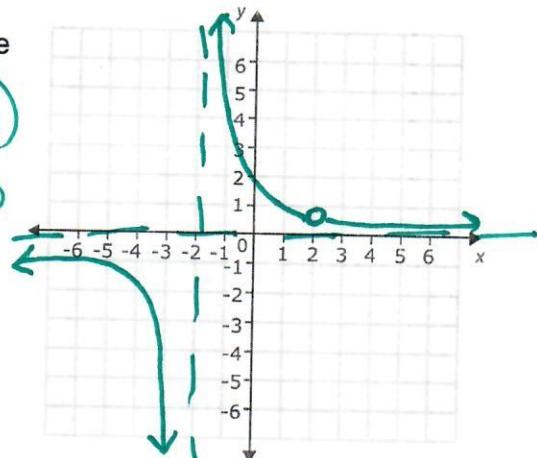
- Factor
- RD \rightarrow factor cancels
- HA \rightarrow degree of top degree of bottom
- VA \rightarrow bottom = 0

$$\begin{aligned} &\frac{3(x-2)}{(x-2)(x+2)} \\ &f(x) = \frac{3}{x+2} \end{aligned}$$

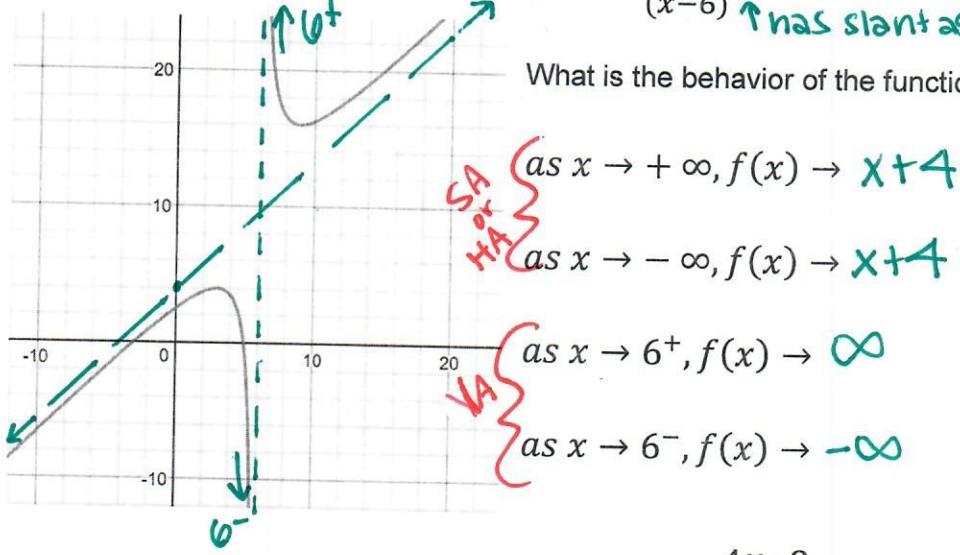
RD: $(2, \frac{3}{2+2})$

HA: $\frac{\text{low}}{\text{high}} y=0$

VA: $x+2=0$
 $x=-2$



10. The graph of rational function $f(x) = \frac{x^2-2x-15}{(x-6)}$ is shown below. **Slant (oblique) asymptotes** \uparrow has slant asymp! **high** \uparrow , exactly one degree bigger
use division to find



11. The equation for a rational function is given. $y = \frac{4x-8}{x^2-4}$. List where the function is discontinuous and state the type(s) of discontinuity.

discontinuities happen when denominator = 0 in original function

$$y = \frac{4(x-2)}{(x-2)(x+2)}$$

RD: $x=2$

VA: $x=-2$

removable discontinuity at $x=2$ and vertical asymptote at $x=-2$ (infinite discontinuity)

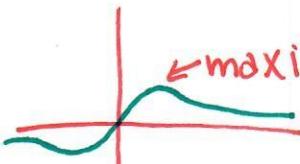
12. The percentage of concentration of a certain drug in the bloodstream x hours after the drug is administered is given by $f(x) = \frac{5x}{x^2+9}$. What is the maximum percentage of a drug that is possible in this situation?

plug into calculator

$f(x)$

0.833

oh boy, that's a lot??



maximum (2nd TRACE 4:maximum)

$$(3, \frac{5}{6})$$

0.833