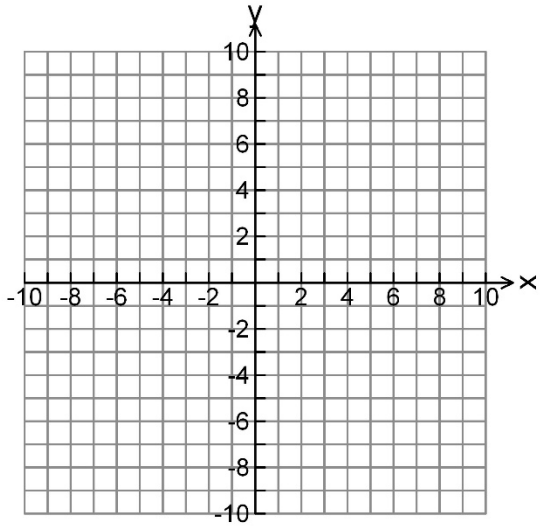
Section 3.5: Rational Functions, Graphs

Video 1

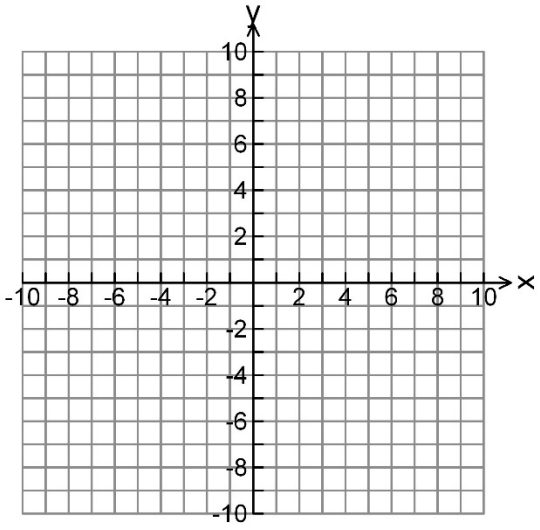
1) Sketch the graph of $f(x)=\frac{1}{x}$.

State the domain and range, and the largest open intervals of the domain over which the function is increasing or decreasing.



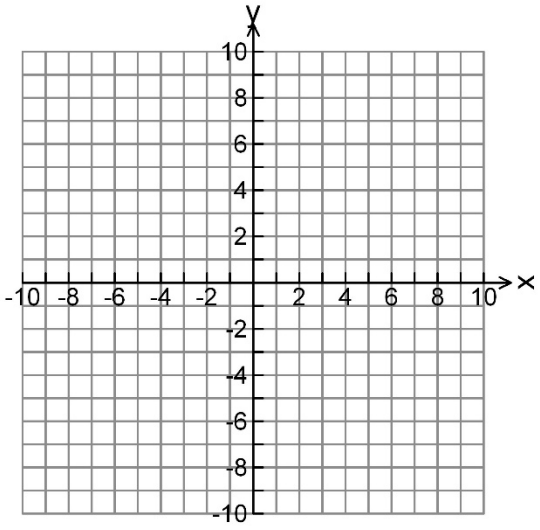
2) Sketch the graph of $f(x) = -\frac{4}{x}$.

State the domain and range, and the largest open intervals of the domain over which the function is increasing or decreasing.



3) Sketch the graph of $f(x)=\frac{5}{x-2}+3$.

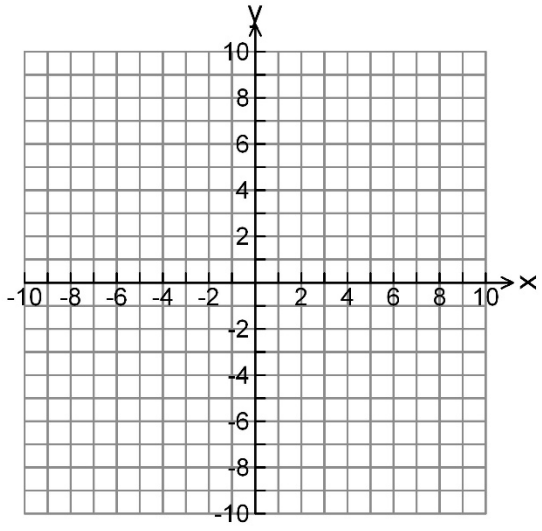
State the domain and range, and the largest open intervals of the domain over which the function is increasing or decreasing.



Video 2

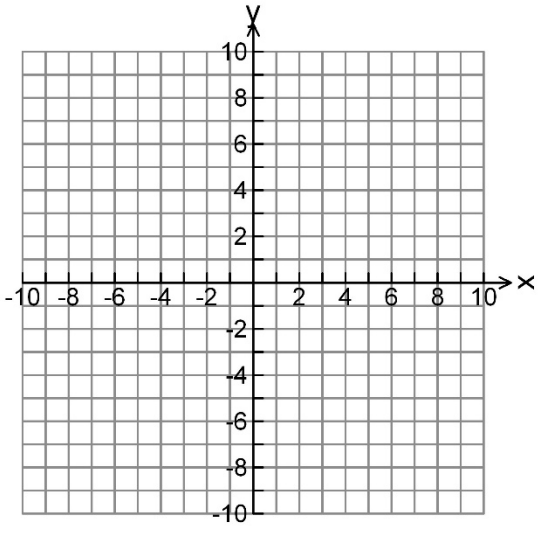
4) Sketch the graph of $f(x)=\frac{1}{x^2}$.

State the domain and range, and the largest open intervals of the domain over which the function is increasing or decreasing.



5) Sketch the graph of $f(x) = -\frac{3}{(x+1)^2} + 2$.

State the domain and range, and the largest open intervals of the domain over which the function is increasing or decreasing.



Video 3

Finding Asymptotes

If $f(x)$ is a rational function is lowest terms, here is how to find its vertical asymptotes and horizontal or oblique asymptote.

- **Vertical Asymptote**: Find the zeros of the denominator.
  If *a* is a zero of the denominator, then $x = a$ is a vertical asymptote.
- **Other Asymptotes**:
  If the degree of the numerator is less than the degree of the denominator, then $y = 0$ is a horizontal asymptote.

  If the numerator and denominator have the same degree, then $y = \frac{a}{b}$ is a horizontal asymptote, where *a* is the leading coefficient of the numerator and *b* is the leading coefficient of the denominator.
  If the degree of the numerator is exactly 1 greater than the degree of the denominator, then the function has an oblique (slant) asymptote. Find it by dividing.

Find all asymptotes of the given rational functions.

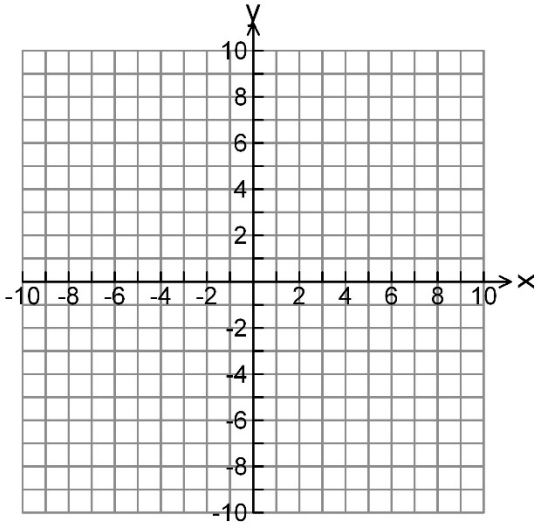
6) $f(x) = \frac{x-5}{x^2-3x-28}$

7) $f(x)=\dfrac{6x-4}{2x+3}$

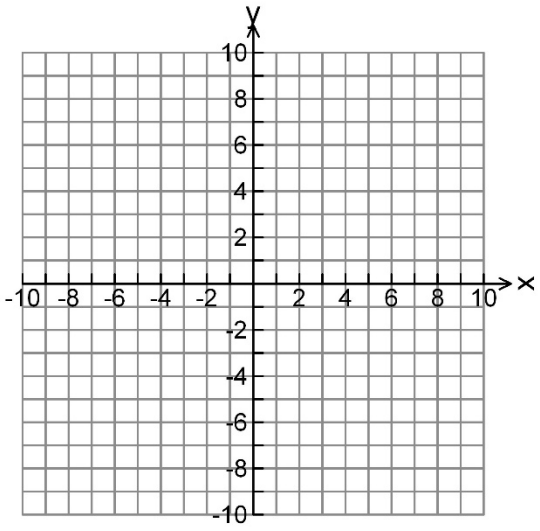
8) $f(x)=\dfrac{2x^2-8x-10}{x+3}$

Video 4

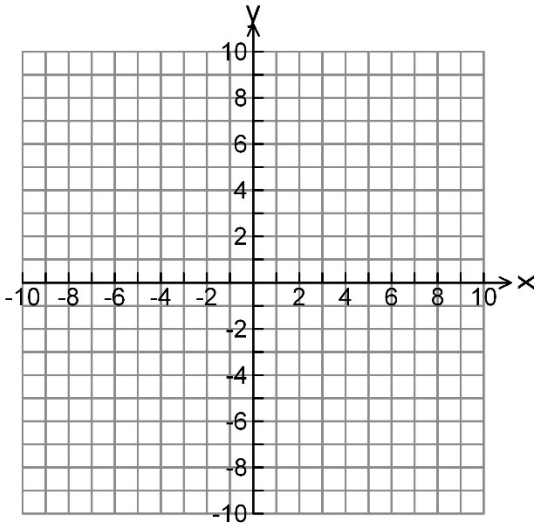
9) Graph $f(x)=\dfrac{x-4}{x^2+3x+2}$.



10) Graph $f(x)=\dfrac{3x-6}{x+5}$.

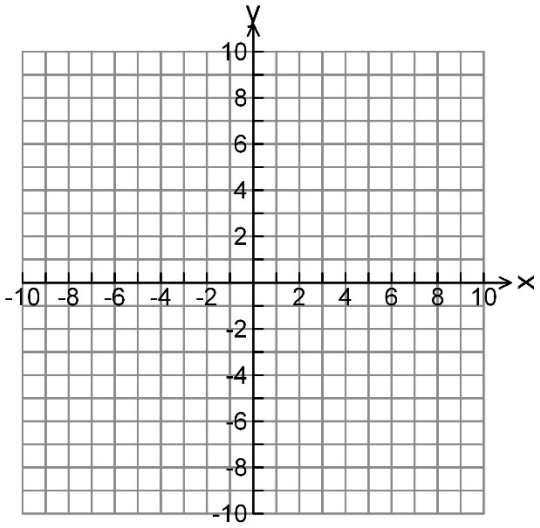


11) Graph $f(x)=\dfrac{2x^2+10x-12}{x^2+7x+12}$.



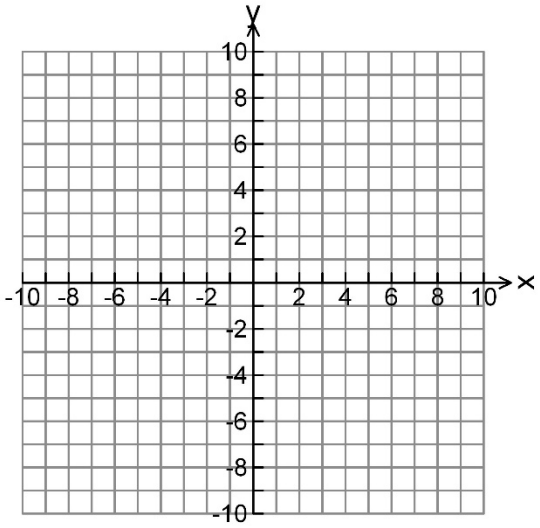
Video 5

12) Graph $f(x)=\dfrac{x^2-2x-8}{x+3}$.



Video 6

13) Graph $f(x)=\dfrac{x^2-4x-12}{x-6}$.



14) Graph $f(x)=\dfrac{x^2-4}{x^2+3x-10}$.