Rational Functions and Equations

Introduction to Rational Functions

Rational Function

Let *p(x)* and *q(x)* be polynomials with *q(x)*≠0. Then a **rational function** is given by

$$R(x) = \frac{p(x)}{q(x)}$$

Determine if the function is rational. If not, why?

Rational Function?	Yes	No	Why?
$f(x)=\frac{x+4}{x^3-x^2+1}$			
$g(x)=\frac{\lvert x+1\rvert}{2x}$			
$h(x)=\frac{3}{x^2-1}$			
$k(x)=\frac{6-x}{\sqrt{x+1}}$			
$m(x)=\frac{\sqrt{5}x^2+1}{x}$			
$p(x)=\frac{5-x^{-3}}{x^{0.9}+2x-1}$			

Find the domain of each function. Write your answer in set-builder or interval notation.

$$r(x)=\frac{x+1}{x^2}$$

Domain in set-builder notation:_____

Domain in interval notation:_____

$$s(x)=\frac{x+3}{x^2+16}$$

Domain in set-builder notation:_____

Domain in interval notation:_____

$$q(x)=\frac{x-6}{x-6}$$

Domain in set-builder notation:_____

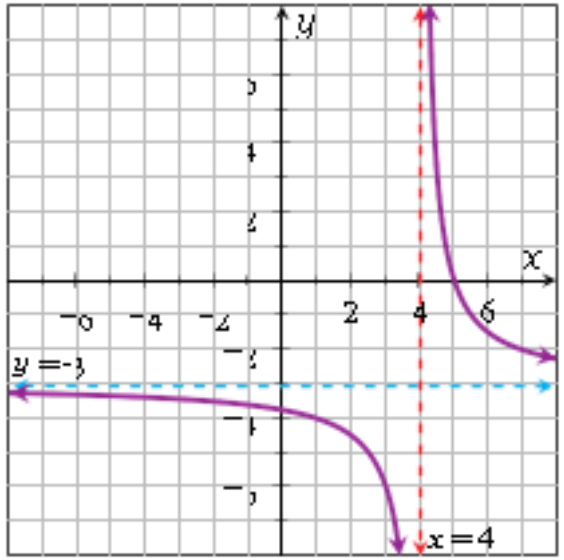
Domain in interval notation:_____

$$p(x)=\frac{x-7}{x^2-7x-18}$$

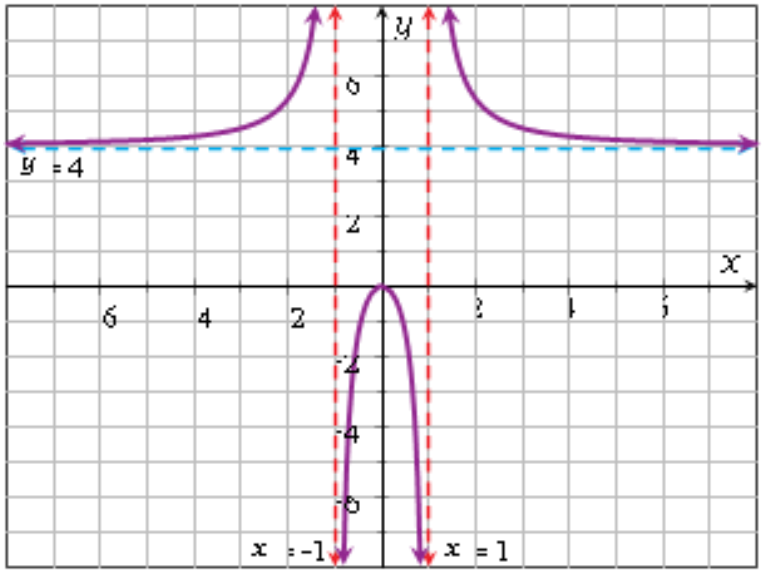
Domain in set-builder notation:_____

Domain in interval notation:_____

Find the domain and range of each function. State the domain and range of the following functions in both set-builder and interval notation.



Graph of *h(x)*



Graph of *f(x)*

Domain in set-builder notation:_____

Domain in interval notation:_____

Range in set-builder notation:_____

Range in interval notation:_____

Domain in set-builder notation:_____

Domain in interval notation:_____

Range in set-builder notation:_____

Range in interval notation:_____

When a drug is injected, the amount of the drug in a person's bloodstream (in milligrams per liter) after t hours can be modeled by

$$d(t) = \frac{4t}{t^2 + 4}$$

Use graphing technology throughout this problem.

a) What is the drug's concentration after 6 hours?

b) When does the drug reach its maximum concentration in the blood stream and what is that maximum concentration?

c) If the patient can't receive another injection until the drug concentration has worn off to 0.5 milligrams per liter, how long must the patient wait to receive the drug again?

d) In the long run, what will be the drug's concentration in the bloodstream?