UNIT 4 WORKSHEET 13
The Domain of a Rational Function

The domain of a rational function is found using only the vertical asymptotes. As previously noted, rational functions are undefined at vertical asymptotes. The rational function will be defined at all other x values of the domain.

$$f_{(x)} = \frac{x}{(x+2)(x-3)}$$

Here is a rational function in completely factored form.

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

Since the zeros of the denominator are -2 and 3, these are the vertical asymptotes of the function.

Therefore, the domain of this function is $(-\infty,-2)\cup(-2,3)\cup(3,\infty)$. ***Notice there are two vertical asymptotes, and the domain is split into three parts. This pattern will repeat. If there are 4 vertical asymptotes, the domain of that function will be split into 5 parts.***

Find the domain of each of the following rational functions.

A) $f_{(x)} = \frac{x-7}{x+5}$

B) $f_{(x)} = \frac{3}{x^2-4}$

C) $f_{(x)} = \frac{x^2}{x-5}$

D) $f_{(x)} = \frac{2x^2-5x+3}{x-1}$

E) $f_{(x)} = \frac{x-8}{x^3-x^2-12x}$

F) $f_{(x)} = \frac{x^3}{x^2-7x+12}$

G) $f_{(x)} = \frac{1}{3-x}$

H) $f_{(x)} = \frac{x^2-4}{x^4-81}$

I) $f_{(x)} = \frac{x^3-2x^2+5}{x^2}$