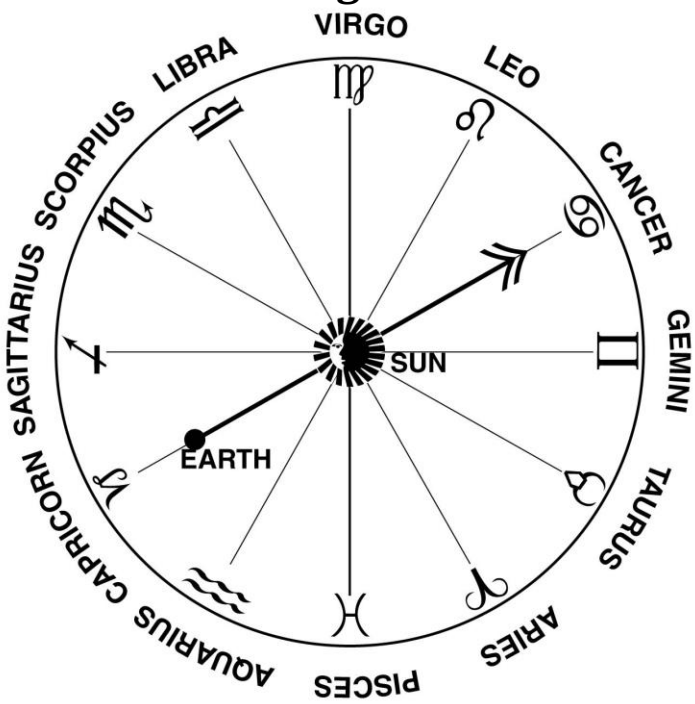
Sign Charts for Rational Functions:

The behavior of a rational function in the vicinity of its vertical asymptotes can be determined by the sign of the function values. To make a sign chart for a rational function, draw a number line and locate the real zeros of the numerator and label them with a *0*, since the function value is zero there. Locate the real zeros of the denominator, and label them with a *u*, since the function is undefined at these values. Use what you know about the graphs of polynomial functions to determine the sign of the rational function on the intervals in between and on the edges.



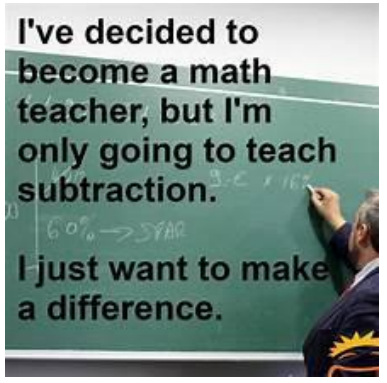
Examples:

1. $f(x) = \dfrac{3x}{x+4}$

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

3. $f(x)=\dfrac{3x}{(x-1)(x-3)^2}$

4. $f(x)=\dfrac{2-x}{(x+1)(x-4)}$



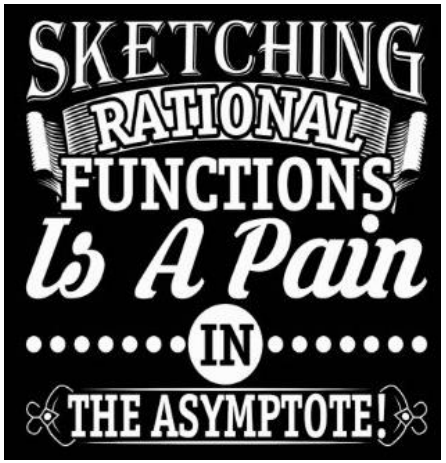
Sketching graphs of rational functions:

1. Find and draw the horizontal, vertical, and slant asymptotes as dashed lines.

2. Label the *x*-intercepts.

3. Label the *y*-intercept.

4. Create the sign chart.



5. Connect all the dots in a reasonable manner using the sign chart as a guide.

"Of course you have problems! You're a math teacher."

Examples:

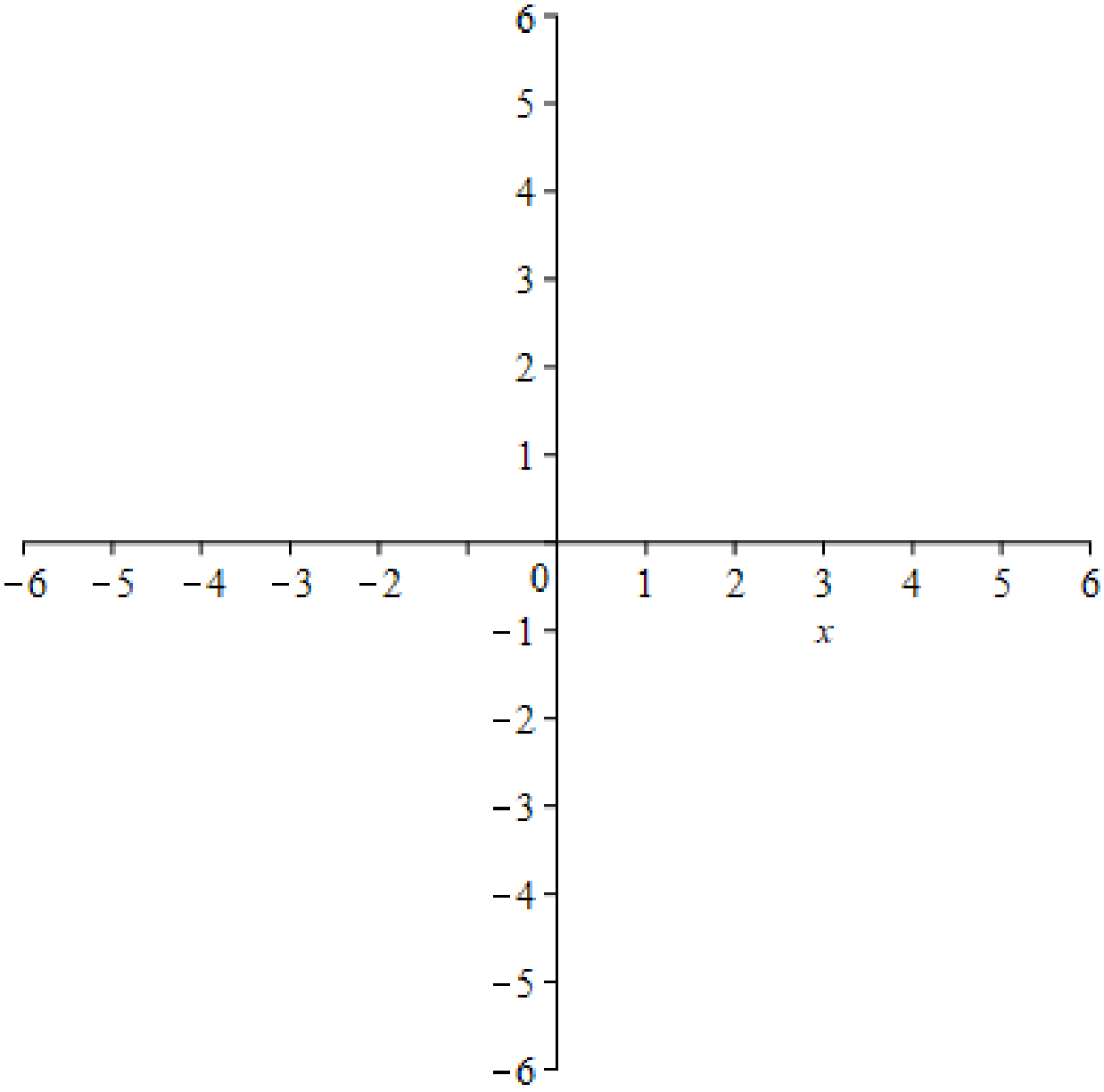
1. $f(x)=\dfrac{x}{(x-1)(x+2)}$

Asymptotes:

H.A.:

V.A.:

S.A.:



Intercepts:

***x*-int(s):**

***y*-int:**

Sign Chart:

2. $f(x)=\dfrac{2x+4}{x-1}$

Asymptotes:

H.A.:

V.A.:

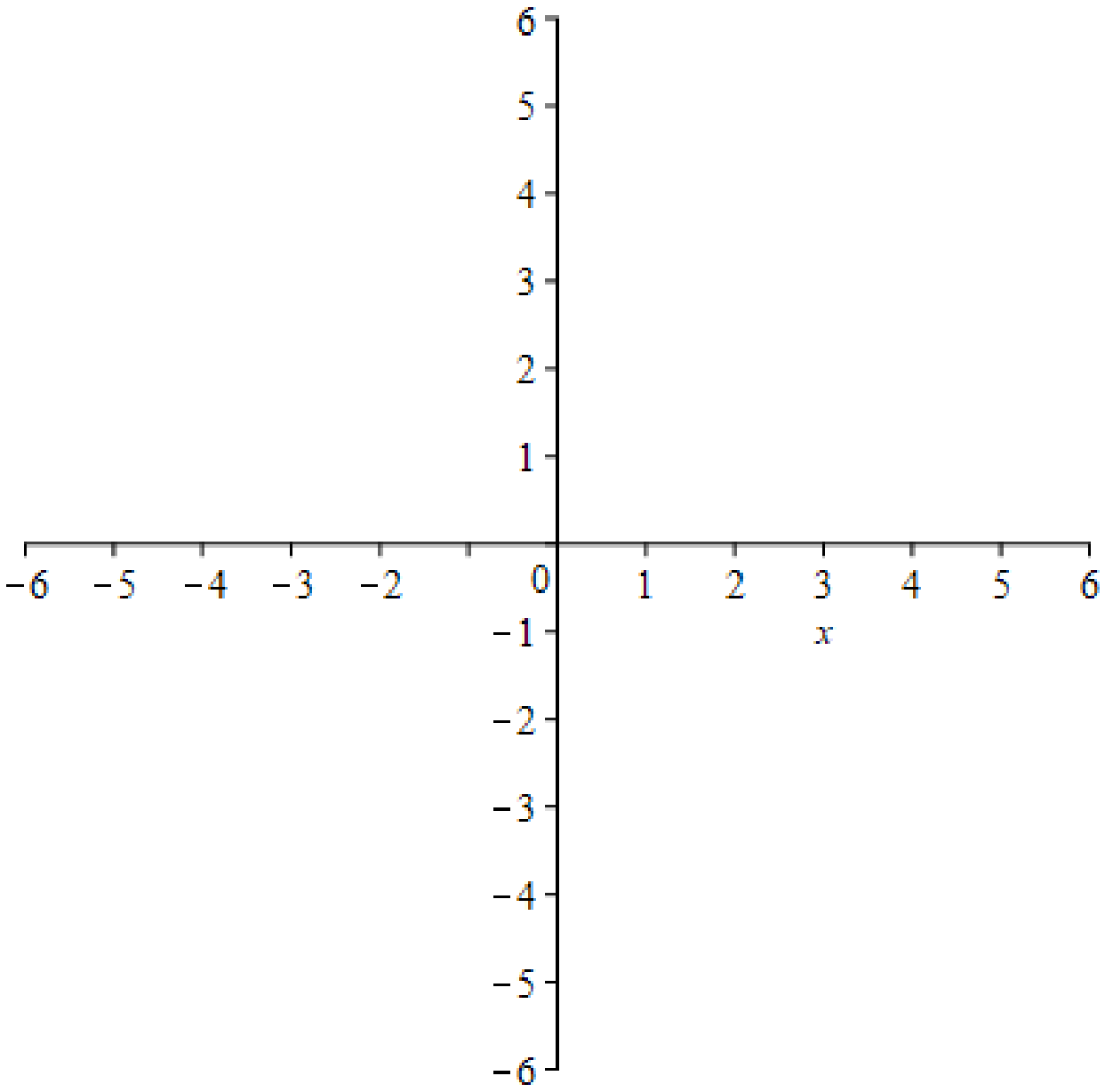
S.A.:

Intercepts:

***x*-int(s):**

***y*-int:**

Sign Chart:



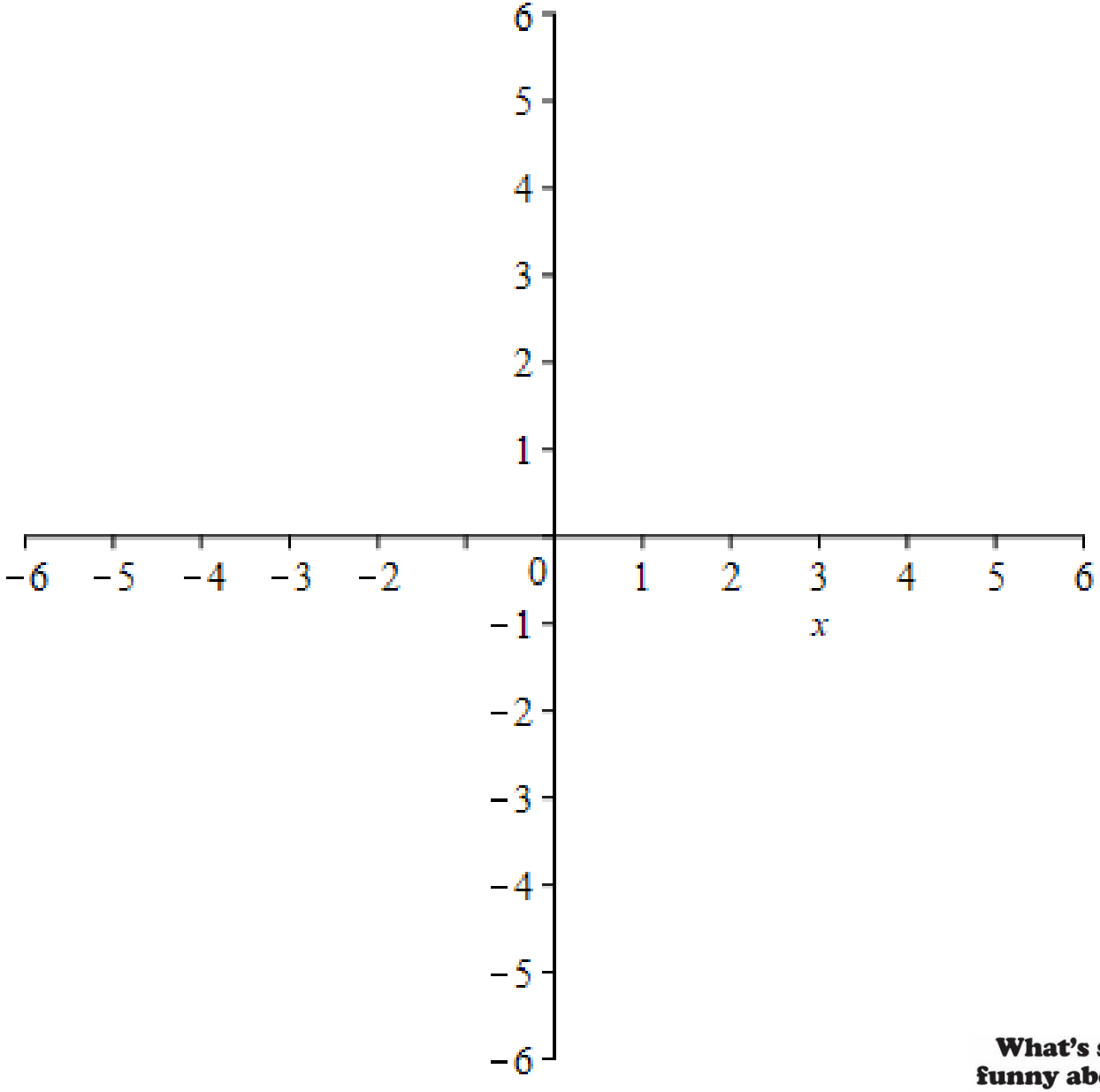
3. $f(x)=\dfrac{x(x-1)^2}{(x+3)^3}$

Asymptotes:

H.A.:

V.A.:

S.A.:



Intercepts:

***x*-int(s):**

***y*-int:**

Sign Chart:

What's so funny about math?

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

Asymptotes:

H.A.:

V.A.:

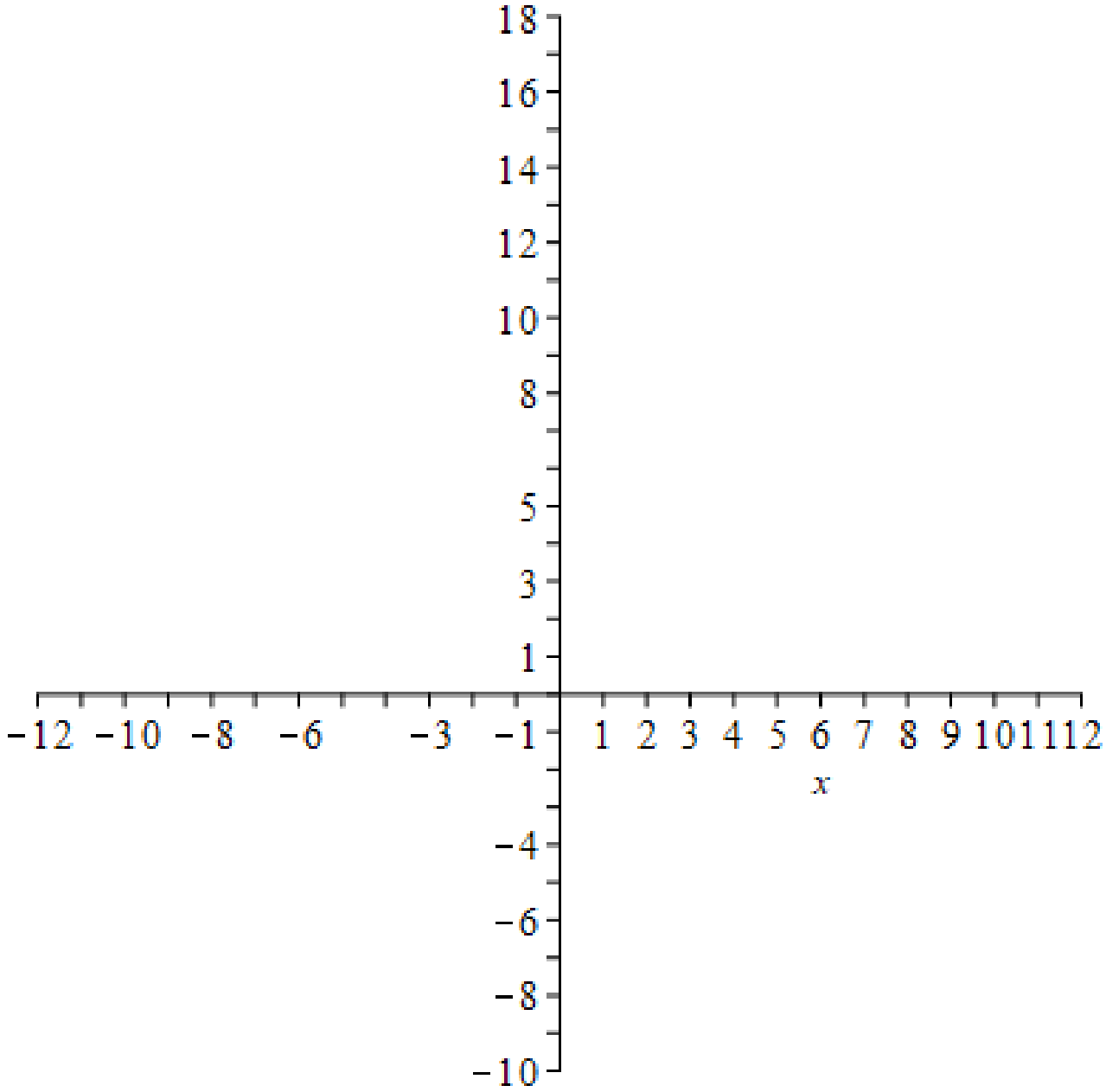
S.A.:

Intercepts:

***x*-int(s):**

***y*-int:**

Sign Chart:



$\frac{16\cancel{3}}{\cancel{3}26} = \frac{1}{2}$

5. $f(x)=\dfrac{2x^2+3x}{x+1}$

Asymptotes:

H.A.:

V.A.:

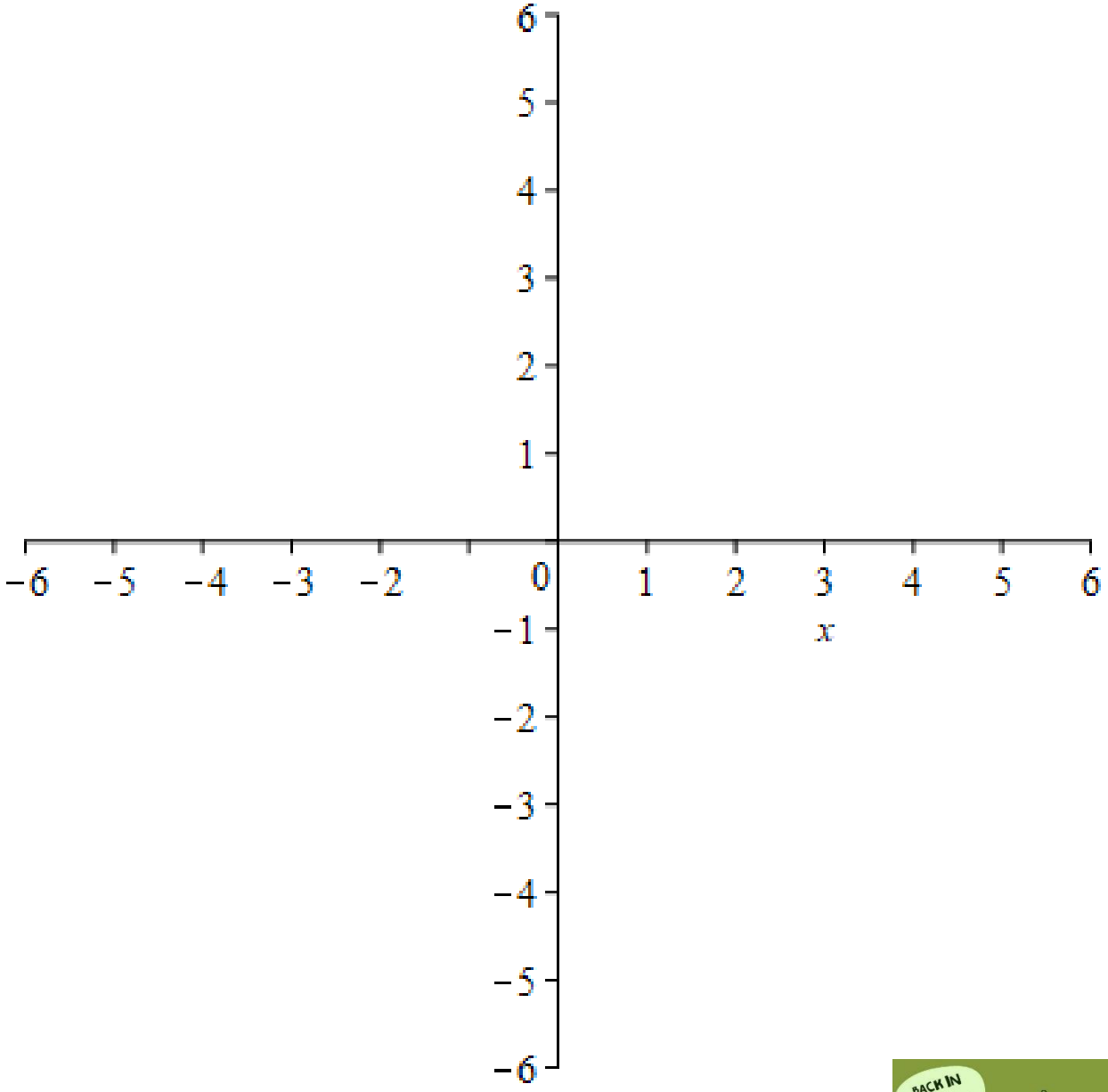
S.A.:

Intercepts:

***x*-int(s):**

***y*-int:**

Sign Chart:



6. $f(x)=\dfrac{x^3+x^2-2}{x+1}$

Asymptotes:

H.A.:

V.A.:

S.A.:

Intercepts:

***x*-int(s):**

***y*-int:**

Sign Chart: